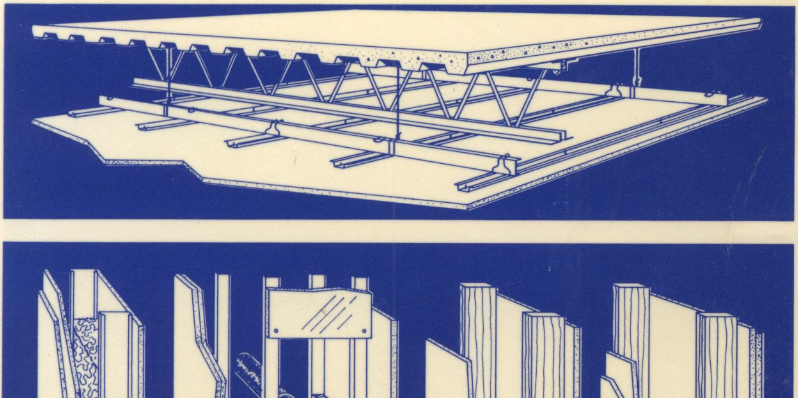
UNITED STATES GYPSUM

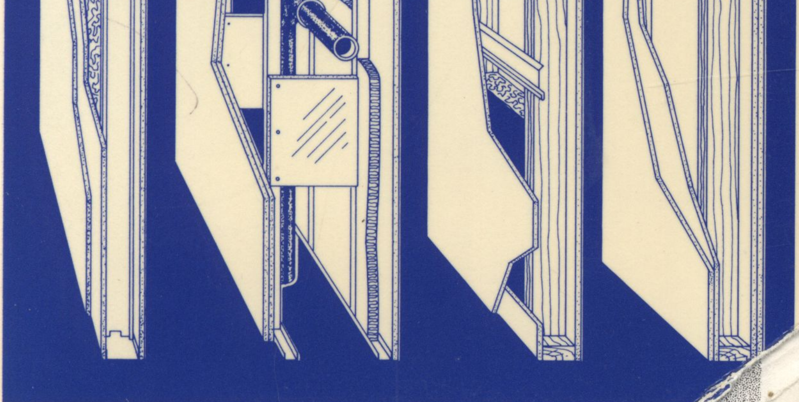
6th edition

drywall construction handbook

with Product and Construction Standards

price $1.50

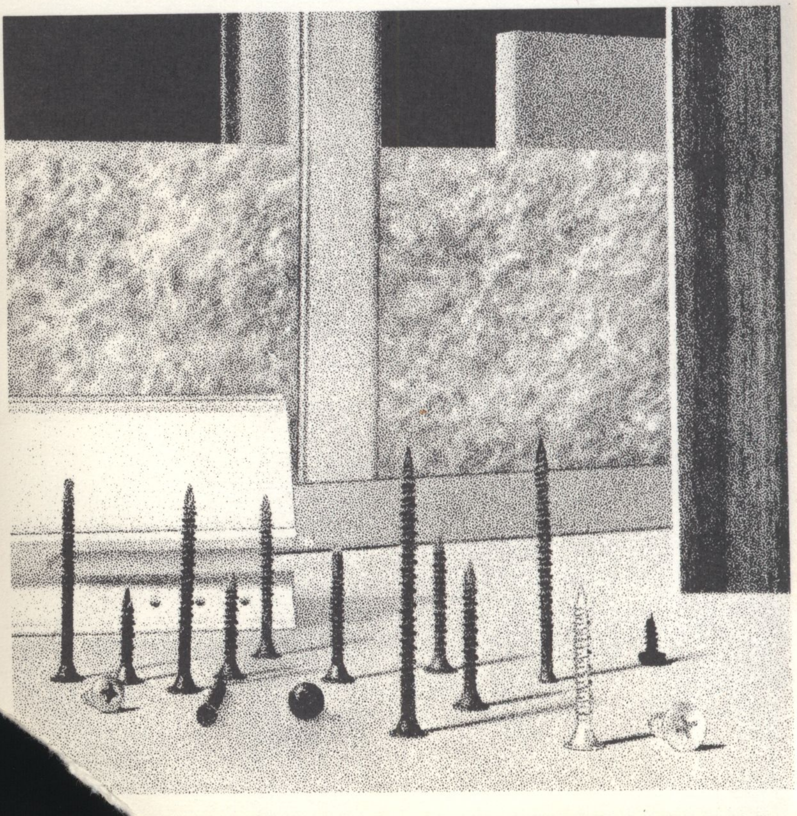




UNITED STATES GYPSUM
101 S. Wacker Dr., Chicago, Ill. 60606, Dept. 122

Notice: The following trademarks used herein are owned by United States Gypsum Company: USG; SHEETROCK; FIRECODE; BAXBORD; ULTRAWALL; PERF-A-TAPE; DURABOND; DUR-A-BEAD; ECONO; PYROBAR; THERMAFIBER; GRAND PRIZE; TEXOLITE; ACREPOX; A-B TEX; DIAMOND; PRO-KYD; IMPERIAL; METAL COAT; TEXTONE; MASTICAL; COVER COAT; INSO-BAK.

Copyright 1971, United States Gypsum Company



gypsum **drywall** construction **handbook**

6th edition

with Product and Construction Standards

. . . about this handbook

This Gypsum Drywall Construction Handbook presents complete data on products and systems developed to simplify and speed construction, enhance appearance, and increase the use of gypsum drywall construction. It contains new product and construction standards for partition, ceiling and fireproofing materials and their application, and revised up-to-date information on tools, systems and physical test data. It is a complete and authoritative guide, valuable for those having limited knowledge or broad experience in gypsum drywall construction.

how it serves you

This handbook will serve as a quick and comprehensive reference for any drywall information you want:

Architects and Builders—Complete information on drywall product and construction standards including system descriptions, advantages, limitations and installation procedures.

Contractors and Dealers–Full data on all aspects of gypsum drywall products and accessories, tools, product application, including estimating and planning.

Applicators, experienced or beginners—Clear, concise illustrated instructions on all phases of gypsum drywall application from framing to finish.

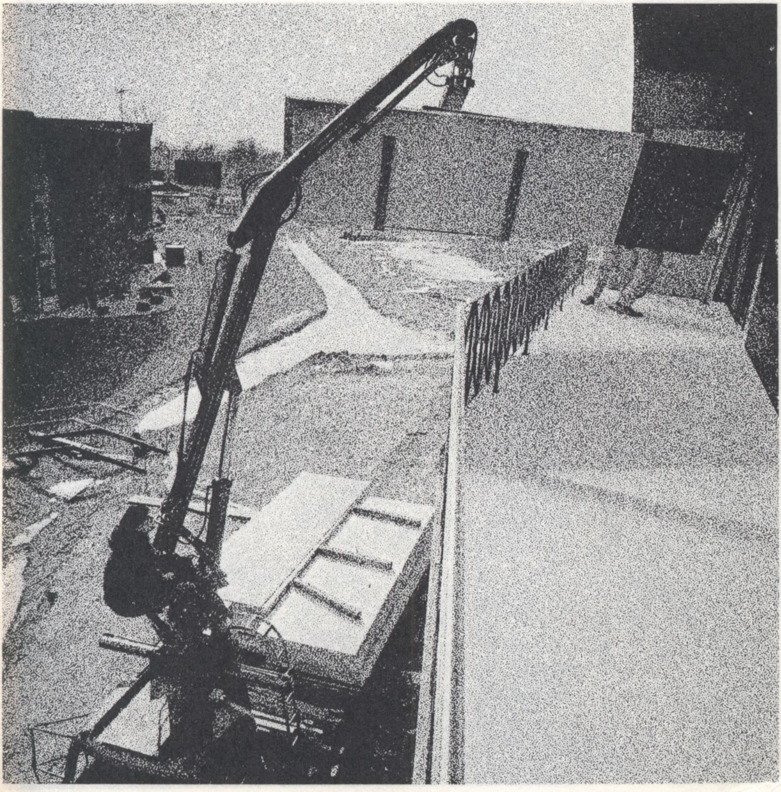
Building Inspectors and Code Officials—Fire and sound test data; proper construction procedures for products which must be used together to meet fire and sound rating requirements.

to find the information you want:

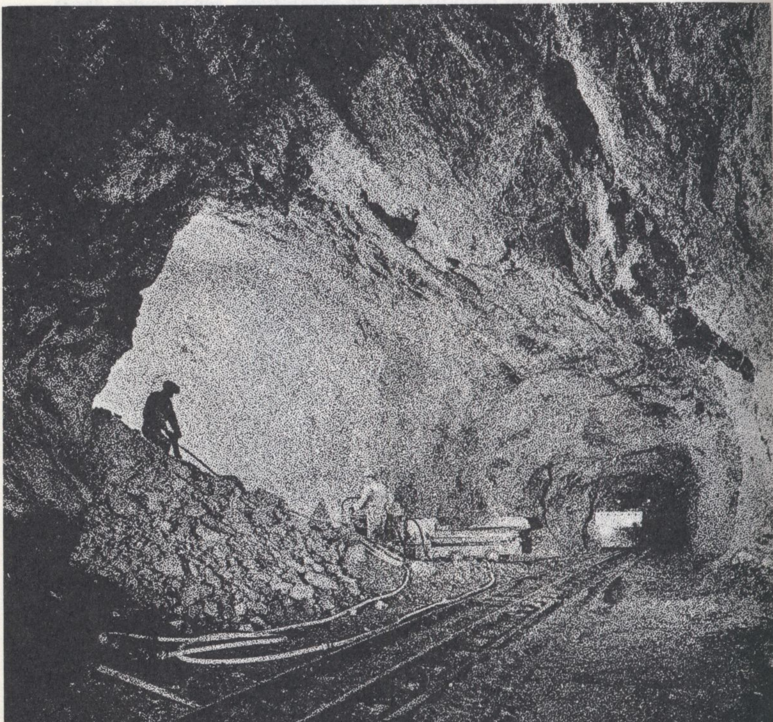
Use the fully cross-referenced index at the back. Or—check Table of Contents on page 5 to find the applicable chapter, then use the detailed table on the first page of that chapter to find the right page. For example, if you want information on metal trim, it's in the index both as "Metal trim" and "Trim, metal." Also, the facing Table of Contents shows Product Standards beginning on page 10 and the table of contents at the start of the chapter shows the page where metal accessories are found.

table of contents

chapter	title	page
1.	Product Standards	10
2.	Construction Standards—General Product Application	60
3.	System Installation	168
4.	Physical Test Data	218
5.	Problems and Remedies	260
6.	Tools	282
	Appendix	298
	Index	299



introduction



the drywall revolution

In the past quarter-century, gypsum drywall construction has revolutionized the building industry. A dynamic expansion is taking place—to the point that today more than 80% of all new residential buildings have sturdy, beautiful walls and ceilings of fire-resistant gypsum panels.

Within the last 15 years, through leadership in research and development, United States Gypsum has introduced many new products and systems for drywall construction. These systems offer specialized sound control and fire resistance together with speed of installation, strength and low cost. Their wide acceptance in commercial, industrial and institutional construction follows the pattern of drywall's dominance in residential work.

The key product in this revolution is the SHEETROCK Gypsum Panel—the first and most widely used brand of gypsum wallboard. It is available with the scientifically developed eased-edge configuration of SHEETROCK SW—designed to resist joint ridging and cracking—as well as in various types of panels to meet every wall and ceiling requirement.

SHEETROCK SW Panels, after extensive testing under supervision of an impartial engineering firm, have been certified superior at resisting ridging. SHEETROCK SW joint assemblies showed far greater flatness and strength than assemblies using ordinary tapered-edge panels.

SHEETROCK has its beginning in the ground as a gray to white-colored rock called gypsum. The basic ingredient of fireproof panels, gypsum is a nonmetallic mineral composed of calcium sulphate chemically combined with water of crystallization. This "dry" water makes up approximately 20% of the weight of gypsum rock. It is this feature which gives gypsum its fire-resistive qualities and makes it so adaptable to the manufacture of gypsum panels.

After gypsum ore is mined or quarried (illustrated, page 6), it is crushed, dried, ground to flour fineness, and heated or calcined to drive off the greater part of the chemically combined water as steam. This calcined gypsum, or plaster of Paris, is then mixed with water and other ingredients and sandwiched between two sheets of specially treated paper to form a ribbon of SHEETROCK, as illustrated on page 10. After the gypsum core has set, the panels are cut to length, dried, pre-finished as required and packaged for shipment. The entire process is conducted in strict accordance with specifications to meet carefully controlled high quality standards.

Success and continued expansion in gypsum drywall construction depends on keeping standards of quality and appearance high while cutting construction time and costs to a minimum. U.S.G. has consistently been in the forefront of this effort, providing new materials to increase utility and lower costs; new systems with improved fire resistance and sound control; advisory services to promote better materials handling, market analysis and business management; specification and application information as a guide to good construction practices.

advantages of gypsum drywall construction

Fire Resistant—Gypsum will not support combustion. Gypsum when exposed to fire behaves like a cake of ice when the flame from a blowtorch is applied. The ice melts on the surface in contact with the flame while the opposite side remains cool. Similarly, the surface of gypsum panels opposite the flame remains at a relatively low temperature until the gypsum core is completely calcined.

Smooth Unbroken Surfaces—The unique SHEETROCK SW System provides walls and ceiling of flawless beauty with the strongest joints ever developed. A U.S.G. Joint System reinforces and conceals the joints between panels.

Decoration—The strong, highly calendered face paper on SHEETROCK Gypsum Panels is suitable for any type of decorative treatment such as paint, texture or wallpaper and permits repeated redecoration during the life of the building.

Predecorated panels are available which require no painting or joint finishing. Walls are complete as soon as panels are installed. These fire-resistant panels have a durable finish that is easily maintained.

Minimum Moisture—SHEETROCK Gypsum Panels eliminate use of tons of water on the job. Since excess water is not put into the building, the possibility of moisture damage is minimized.

Crack Resistance—The new SHEETROCK SW System measurably reduces joint imperfections due to extremes in temperature and humidity. Bonded together with a U.S.G. Joint System, SHEETROCK SW panels form walls and ceiling that are exceptionally resistant to cracks caused by minor structural movement, vibrations or settlement.

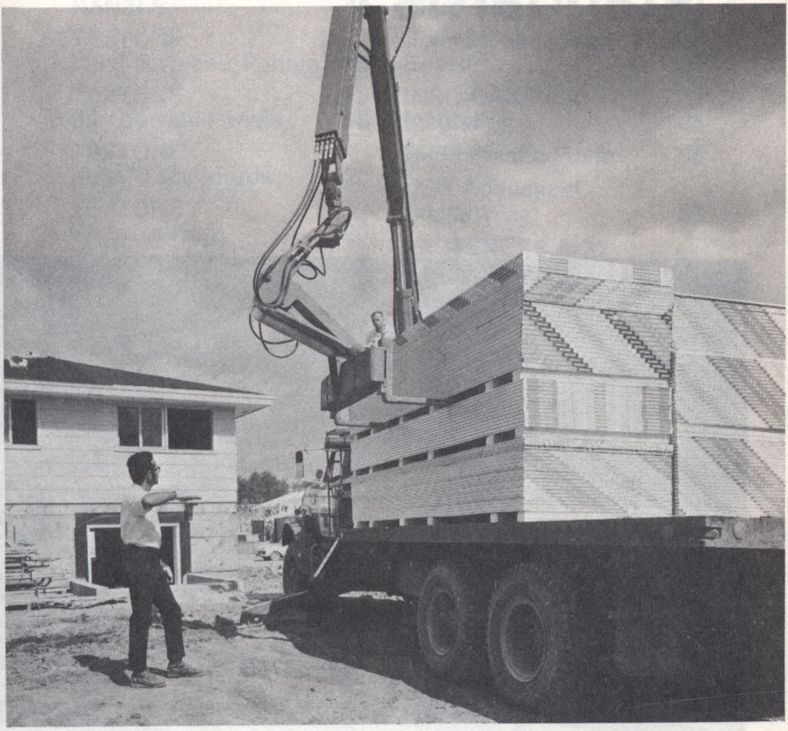
Uniform Quality—SHEETROCK Gypsum Panels are factory-made products. The raw materials and the manufacture are carefully controlled and inspected for quality.

Speed of Erection—SHEETROCK Gypsum Panels are easily cut and quickly applied. This permits earlier completion of construction—and earlier building occupancy.

Snug-Fitting Trim—The uniform thickness of each panel permits installation of wood or metal trim snug to wall surfaces.

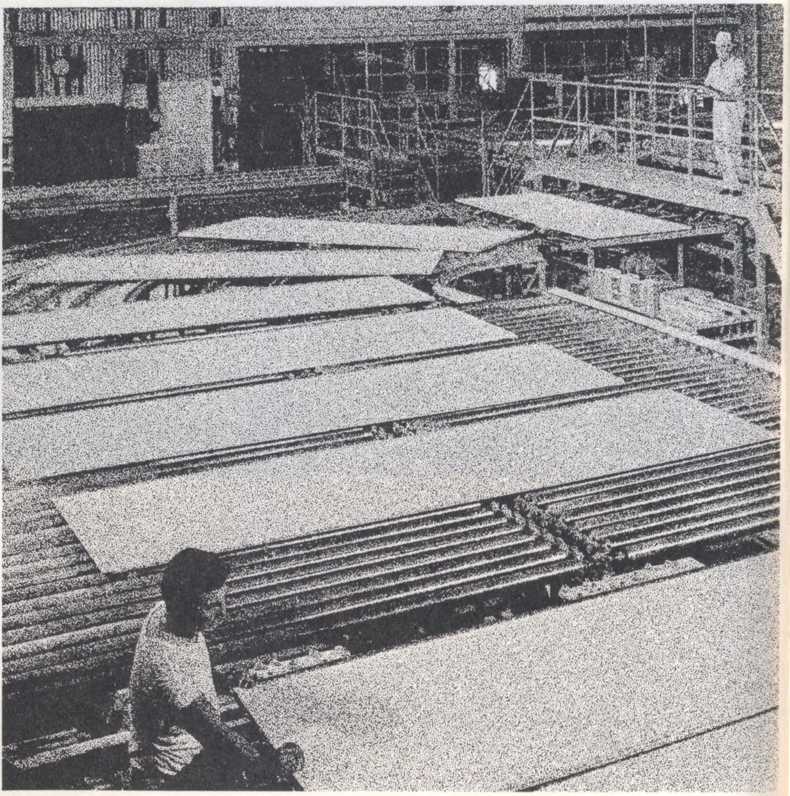
Warp Resistance—Expansion or contraction of SHEETROCK under normal temperature and humidity changes and resulting deformation are negligible.

SHEETROCK *Gypsum Panels come in the widest variety of types available in the industry. Architects, builders and subcontractors rely on USG for leadership in product development—and for consistently high performance.*



chapter 1

product standards



page

GYPSUM PANELS 12
SHEETROCK Gypsum Panels 14
SHEETROCK FIRECODE Panels 14
Foil-Back Panels 15
SHEETROCK W/R Panels 16
USG Exterior Gypsum Ceiling Board 16
PREDECORATED PANELS 18
TEXTONE Vinyl-surfaced Panels 18
TEXTONE Smoothwall Panels 18
TEXTONE Panel Tackboards 20
TEXTONE Wallcovering 20
COREBOARD AND BACKING PRODUCTS 20
USG Coreboard 20
BAXBORD Backing Board 20
BAXBORD FIRECODE Board 20
Foil-Back Backing Board 20
USG R.H. Base 22
USG Gypsum Sheathing 22
USG FIRE FIGHTER Gypsum Board 23
Gypsum Partition Tile 23
TRIM ACCESSORIES 24
Corner Beads 24
Metal Trim 25
Vinyl Trim 26
Control Joints 27
TEXTONE Moldings 29

page

STRUCTURAL ACCESSORIES 30
Metal Studs and Runners 30
Channels—Cold-Rolled, Resilient, Furring 32
SOUND CONTROL & INSULATION PRODUCTS 34
Insulating Blankets 34
Sound Attenuation Blankets 34
Sound Deadening Board 34
INSO-BAK Rigid Insulation 35
Rigid Plastic Foam 35
USG Acoustical Sealant 35
FASTENERS AND ADHESIVES 36
USG Brand Screws 36
Nails 40
Drywall Adhesives 42
JOINT TREATMENT PRODUCTS 44
USG Brand Compounds 46
PERF-A-TAPE Compounds 46
DURABOND Compounds 47
Ready-Mixed Compounds 47
INTERIOR TEXTURE FINISHES 49
Selector Guide to USG Texturing Materials 50
Problems & Remedies—Texturing 53
PAINT SELECTOR 56

quality products for drywall construction

There is only one SHEETROCK Gypsum Panel—the product that has dominated the "drywall" revolution in construction. In the more than 50 years since its introduction, the name SHEETROCK has become a byword for smooth, speedy, fire-resistant finishing of interior walls and ceilings. The name SHEETROCK identifies the nation's largest-selling, broadest line of gypsum boards, No. 1 in quality and performance—developed by the world's No. 1 producer of gypsum products, United States Gypsum.

Leadership in job performance rests on reseach and development. From the U.S.G. Research Center have come dozens of engineered construction systems to make best use of gypsum panel products. They have been developed to achieve the optimum results based on extensive laboratory tests and job-proven performance. The United States Gypsum trademark assures you of proven product quality to meet your construction needs.

The products described and illustrated in this chapter conform to product standards recommended by United States Gypsum Company for gypsum drywall construction. These materials meet the essential requirements of economy, speed of installation, strength, fire resistance, and ease of decoration which are characteristic of quality drywall.

Special sales representatives are maintained by U.S.G. to consult with contractors, architects and dealers on drywall products and systems and their application to individual job problems and conditions. They may be reached through the nearest U.S.G. sales office or by directing inquiries to United States Gypsum, Dept. 147-2, 101 S. Wacker Dr., Chicago, Ill. 60606.

gypsum panel products

description

SHEETROCK is a factory-fabricated panel composed of a fireproof gypsum core encased in a heavy manila-finished paper on the face side and a strong liner paper on the back side. The face paper is folded around the long edges to reinforce and protect the core, and the ends are square-cut and finished smooth.

advantages

Interior walls and ceilings built with SHEETROCK have a durable surface suitable for most types of decorative treatment and for repeated decoration during the life of the building. The joints between adjacent panels may be reinforced and concealed with a U.S.G. Joint System, or may be featured by leaving exposed or covering with a decorative molding.

Drywall Construction—factory-fabricated panels eliminate excessive moisture in construction.

Fire Resistance—Ratings of up to 2 hours for partitions, 3 hours for floor-ceilings and 4 hours for column fireproofing assemblies have been obtained. See Chapter 4 for fire-resistance ratings and related construction.

Sound Control—Sheetrock Gypsum Panels are a vital component in sound-resistive partition and floor-ceiling systems. See Chapter 4 for sound ratings.

Crack Resistance—Exceptionally resistant to cracks caused by minor frame movement, vibration or settlement.

Quickly and Easily Applied—keeps construction costs low.

Readily Decorated—with paint, texture, or wallpaper.

Warp Resistant—under normal atmospheric conditions.

Availability—24 strategically located U.S.G. operating plants produce and/or stock gypsum panel products described here. Special warehouse facilities, in addition to these plants, increase total distribution and service efficiency to major markets and rural areas from coast to coast. All standard or specialty gypsum panel products are readily available upon short notice.

general limitations

1. Not recommended where exposure to moisture is extreme or continuous.

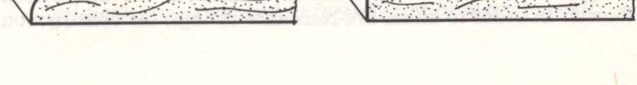
2. Must be adequately protected against wetting when used as a base for ceramic or other wall tile (see Foil-Back Sheetrock limitation). Sheetrock W/R Gypsum Panels are recommended for this purpose.

3. Maximum framing spacing: ½″ and ⅝″ Sheetrock Gypsum Panels are designed for framing centers from 16″ to 24″; ⅜″ Sheetrock, on centers up to 16″. When ½″ or ⅝″ Sheetrock Gypsum Panels are applied across framing on 24″ centers and panel joints reinforced, headers are not required.

4. Nail application of Sheetrock over ¾″ wood furring applied across framing is not recommended since the relative flexibility of the furring under impact of the hammer tends to loosen nails already driven. Furring should be 2″x2″ minimum.

5. The application of Sheetrock over an insulating blanket, that has first been installed continuously across the face of the framing members, is not recommended. Blankets should be recessed and the blanket flanges attached to sides of studs or joists.

Types of Edges



SHEETROCK SW Gypsum Panels are United States Gypsum's revolutionary development to minimize ridging or beading and other joint imperfections—so effective they're patented under U.S. Pat. No. 3,435,582. An exclusive eased-edge design helps to compensate for twisted framing, offset joints, poor framing alignment, damaged panel edges, and even for extremes of temperature and humidity during construction. One of drywall's foremost advances in 40 years, the SHEETROCK SW Gypsum Panel system produces the strongest joint ever developed.

This is accomplished by pre-filling joints with DURABOND 90 Joint Compound, a special formulation which chemically hardens in about one hour, providing maximum bond and minimum shrinkage. The rounded-edge contour eliminates the need to crown joints, and no more compound is required than with regular gypsum panels. Taping of joints and other application procedures for joint treatment systems are conventional.

Except for the eased edge, SHEETROCK SW is tapered like, and otherwise identical to, regular tapered edge gypsum panels. Made in three thicknesses:

—⅝", recommended for the finest single-layer drywall construction. The greater thickness provides increased resistance to fire exposure and transmission of sound.

—½", for single-layer application in new construction.

—⅜", lightweight, applied principally in the double wall system and in repair and remodel work. Not recommended for metal framing spaced over 16" o.c.

Tapered Edge SHEETROCK Panels have long edges tapered on the face side in order to form a shallow channel for the joint reinforcement which provides smooth, continuous wall and ceiling surfaces. Made in the same thicknesses as SHEETROCK SW Gypsum Panels and in one other thickness:

—¼", a lightweight, low-cost utility board, used as a base layer for improving sound control in double-layer metal and wood stud partitions and for use over old wall and ceiling surfaces.

SHEETROCK SW FIRECODE Gypsum Panels, ⅝" thick, combine all the advantages of Regular SHEETROCK with additional resistance to fire exposure—the result of a specially formulated mineral core.

SHEETROCK SW FIRECODE "C" Gypsum Panels are available in ½" and ⅝" thicknesses. ½" FIRECODE "C" Panels make possible fire ratings not previously obtainable with ⅝" FIRECODE Panels. Based on tests at Underwriters' Laboratories, Inc. and other nationally recognized testing agencies, certain partition, floor-ceiling, and column fireproofing assemblies afford 45-minute to 4-hour fire-resistance ratings. These products are used in 3-hour floor and ceiling, 2-hour wall and 2, 3 and 4-hour column fireproofing constructions (see Chapter 4).

Limitation in addition to General Limitations for SHEETROCK Panels: In order to attain fire-resistance ratings, the construction of the partition and/or floor and ceiling assemblies must be in accordance with the respective Underwriters' Laboratories, Inc., or other tested panel designs. See Chapter 3—System Installation, for brief description of fire-rated systems.

Foil-Back SHEETROCK Gypsum Panels are made by laminating a sheet of bright aluminum foil on the back surface of standard board. Used effectively as a vapor barrier for exterior walls and ceilings when applied (1) with foil surface next to the studs in single layer application, or (2) as the base layer (with foil surface next to the studs) in the double-layer system. A significant thermal insulating value is achieved when SHEETROCK is installed with the aluminum foil facing an air space of ¾" minimum. The metal foil reduces outward heat flow in winter, inward heat flow in summer.

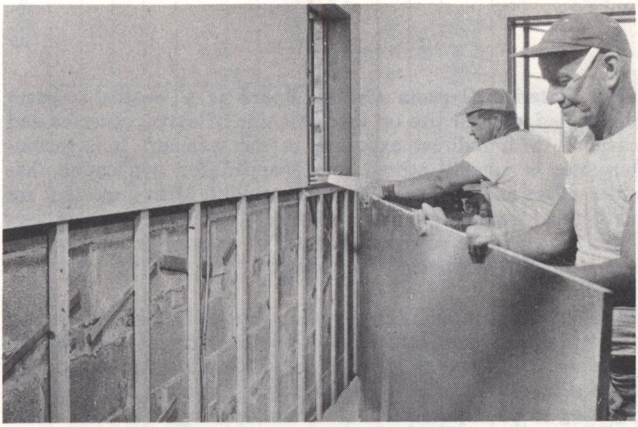
Foil-Back SHEETROCK also provides an efficient vapor barrier which resists the passage of moisture vapor through the exterior wall and roof construction. The possibility of condensation within an exterior wall and resulting exterior paint failures is minimized. Meets ASTM requirements for a vapor permeability not exceeding 0.30 perm.

Limitation: do not use as a base for ceramic or other tile.

Thermal Resistance (R) Values
Foil-Back SHEETROCK Panels(1)

Thickness	½"	⅝"
wall application	3.93	4.04
ceiling application		
summer conditions	4.92	5.03
winter conditions	2.73	2.84

(1) Resistance based on inside still air film, panel thickness and one reflective surface facing a ¾" min. still air space.



Foil-Back Panels applied to furred exterior masonry wall.

SHEETROCK W/R Gypsum Panels are a water-resistant base for the adhesive application of ceramic, metal, and plastic tile. They are water-resistant all the way through: (1) multi-layered face and back paper chemically treated to combat penetration of moisture; (2) gypsum core made water-resistant with a special asphalt composition. Developed for application in bathrooms, powder rooms, kitchens, utility rooms, and other high-moisture areas. SHEETROCK W/R Gypsum Panels are easily recognized by their distinctive green face.

In addition to their use as a superior tile base in new construction, SHEETROCK W/R Panels are a cost-saver in modernization work. New tilework can be installed over existing surfaces without tearing out old walls.

Limitations: adherence to recommendations concerning sealing exposed edges, painting, tile adhesives, framing and installation is necessary for satisfactory performance (see Chapter 2). Not recommended for use as an exterior soffit or in other exterior areas subjected to sustained high humidity and moisture.

Available in regular core, ½″ and ⅝″ thickness; also in ⅝″ SHEETROCK W/R FIRECODE "C" Panels for application where a 1-hour fire rating is desired—listed under UL Label Service R-1319-84 with the following design numbers applicable: 1-hr. U305, U512, U308; 2-hr. U301, U411.

SHEETROCK Brand W/R Sealant is applied to all raw cut edges and nailheads of special SHEETROCK Water-Resistant Gypsum Panels used in high-moisture room areas—thus protecting the gypsum core from moisture penetration. Packaged in 1-pt. brush-on container for fast, easy application.

USG Exterior Gypsum Ceiling Board is a weather-resistant board designed for use on the soffit side of eaves, canopies and carports with indirect exposure to the weather. It is incombustible, is quickly scored and snapped for application, has eased edges and offers excellent paintability. Most important are its sag and water-resistance advantages–which independent tests have shown to be superior to those of exterior grade plywood and structural laminated paper board.

Installed conventionally in wood and metal-framed soffits; batten strips used over butt joints or panel ends inserted into H-molding. Joints may be finished with DURABOND XL Compound if area to be surfaced does not cover structural stress points. Backing strips required for small vent openings. Has brown back paper and gray, water-repellent face paper.

Specifications—Gypsum Panel Products

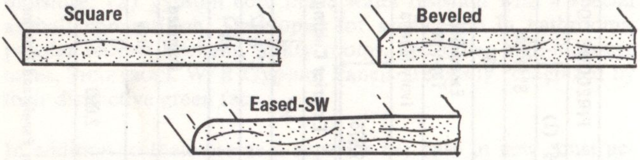
Panel Type	Regular	SW and Regular			FIRECODE	FIRECODE "C"	
Thickness	¼″	⅜″	½″	⅝″	⅝″ (1)	½″ (1)	⅝″
Lengths	8′ & 10′	8′ to 14′			8′ to 14′	8′ to 14′	
Width	48″	48″			48″	48″	
Edges	Tapered	Eased-SW Tapered (2)			Eased-SW Tapered	Eased-SW Tapered	
Face Finish	Ivory Manila	Ivory Manila			Ivory Manila	Ivory Manila	
Approx. Wt. (lbs./MSF)	1,097	1,475	1,875	2,375	2,475	1,975	2,475

Panel Type	Foil-Back Panels			W/R Panels		W/R FIRECODE "C"	Exterior Ceiling Board	
Thickness	⅜″	½″	⅝″	½″	⅝″	⅝″	½″	⅝″
Lengths	8′ to 14′			8′ & 12′		8′ & 12′	8′ & 12′	
Width	48″			48″		48″	48″	
Edges	Eased-SW Tapered			Tapered		Tapered	Rounded	
Face Finish	Ivory Manila			Green Manila		Green Manila	Gray	
Approx. Wt. (lbs./MSF)	1,500	1,900	2,400	1,875	2,375	2,475	2,000	2,500

(1) Available with Foil-Back, special order only. (2) Also available with beveled edges, special order only.
SHEETROCK Gypsum Panels comply with Fed. Spec. SS-L-30c, ASTM C36; SHEETROCK W/R Gypsum Panels with ASTM C630.
Fire-hazard classification of SHEETROCK Gypsum Panels: flame spread, 15; fuel contributed, 15; smoke developed, 0. For SHEETROCK W/R Gypsum Panels and Exterior Ceiling Board: flame spread, 20; fuel contributed, 5; smoke developed, 0.

predecorated panels

Types of Edges



TEXTONE Gypsum Panels are standard panels with factory-applied vinyl facings in a wide range of coordinated decorator colors. Exciting new patterns provide a broad choice of color-texture combinations. The tough vinyl covering is durable and easily cleaned for lasting beauty.

TEXTONE Panels and color-matched moldings, together with adhesives, fasteners and other conventional drywall components, are used for predecorated permanent partitions, demountable partitions, and in remodeling. Not recommended for ceilings because end joints are difficult to conceal.

The rugged, scuff-resistant vinyl is deeply embossed for texture and woodgrain effects. Available in six elegant surface patterns and 27 attractive colors (see table below).

TEXTONE Pattern	No. of Colors	Film Thickness	Backing (cloth count)	Vinyl Weight oz./sq. yd. avg.	Vinyl Thickness—in. avg. (1)
Stipples	8	6 mil	unbacked	6.65	.009
Linens	5	8 mil	unbacked	8.86	.015
Woodgrains	6	6 mil	unbacked	6.65	.007
Travertines	2	8 mil	unbacked	8.86	.013
Textiles (2)	4	8 mil	15-oz. cotton sheeting (32x28)	9.0	.025
Character Woods	2	12 mil	unbacked	13.30	.016

(1) Average overall vinyl film thickness varies with depth of embossing.
(2) Cloth weight is 2.0 oz./sq. yd. avg. Total weight is 11.0 oz./sq. yd. avg.

Nationwide stocks are available in standard panels, ½″ thick, in most colors and patterns. They may also be specially ordered in ⅜″ and ⅝″ thicknesses, 2-ft. widths and custom lengths from 6 to 16 ft. ½″; ⅝″ thick TEXTONE FIRECODE Panels may be specially ordered for fire-rated construction.

TEXTONE Smoothwall Panels have a fabric-backed vinyl facing laminated to a gypsum panel core. A 2″ flap of vinyl extends beyond one edge of the panel, providing selvage for trimming to a butt seam. The assembly provides a monolithic-appearing vinyl surface with flush joints. Available in ½″ and ⅝″ thickness, Standard and FIRECODE Panels, in Linens, Woodgrains, Travertines and Textiles (except Alfalfa color). Film is backed with cotton sheeting; weighs up to approx. 11 oz./sq./yd.

Specifications—Predecorated Panel Products

Panel Type	TEXTONE Standard			TEXTONE FIRECODE		TEXTONE Smoothwall		TEXTONE FIRECODE Smoothwall	
Thickness	⅜″	½″	⅝″	½″	⅝″	½″	⅝″	½″	⅝″
Lengths	8′ to 10′			8′ to 10′		8′ to 10′		8′ to 10′	
Width	48″			48″		48″		48″	
Edges	(1)			(1)		Eased-SW		Eased-SW	
Approx. Wt. (lbs./MSF)	1,550	1,950	2,450	2,050	2,550	1,950	2,450	2,050	2,550

(1) Linens, Stipples and Travertines have beveled edges; other patterns are square-edged.
TEXTONE Panels comply with Fed. Spec. SS-L-30c, Type III; base panel, ASTM C36. Textile pattern vinyl coverings comply with Fed. Spec. CCC-W-408, Type I.

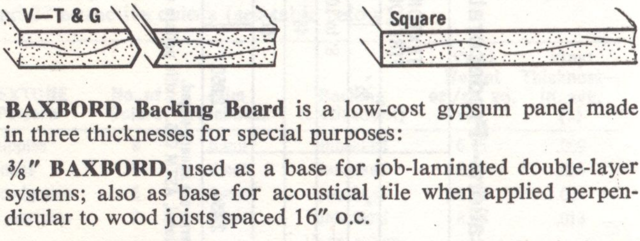
TEXTONE Panel Tackboards provide a decorative surface for bulletin boards or other display areas. Heavy vinyl surface is long wearing, easily cleaned—and Textile weave helps conceal tack holes. In Textile pattern only, ½″ and ⅝″ thick—also in FIRECODE Panels.

TEXTONE Vinyl Wallcovering, a supported vinyl film, 54″ wide, with a 1.3-oz. per sq. yd. cotton backing, is available separately in limited quantities to provide a commercial match with TEXTONE Gypsum Panel colors, textures and patterns on adjacent walls and columns.

coreboard and backing products

USG Coreboard has a 1″ thick fireproof gypsum core encased in strong gray liner paper on both sides. It is used in vent shaft and laminated gypsum partitions with additional layers of gypsum panels applied to the coreboard to complete the wall assembly. Manufactured with "V" T&G edges for use in solid partitions or with square edges and prescored 6″ or 8″ o.c. for use in semi-solid partitions. Coreboard strips are then easily snapped and separated from this master unit.

Types of Edges



BAXBORD Backing Board is a low-cost gypsum panel made in three thicknesses for special purposes:

⅜″ BAXBORD, used as a base for job-laminated double-layer systems; also as base for acoustical tile when applied perpendicular to wood joists spaced 16″ o.c.

½″ BAXBORD, the recommended base for adhesively or mechanically applied acoustical tile. BAXBORD may be screw-applied to USG Metal Furring Channels or nailed to nailable steel joists or wood framing.

⅝″ BAXBORD FIRECODE, used as base for adhesively or mechanically applied acoustical tile when a one-hour fire rating is required. "V" tongue and groove edges minimize air and dirt infiltration.

The gray paper surface of BAXBORD Backing Board is not suitable as an exposed surface.

Foil-Back BAXBORD Backing Board is made in the same three thicknesses as standard BAXBORD, but with aluminum foil laminated to the back surface. It functions as a vapor barrier and as thermal insulation in the same manner as Foil-Back SHEETROCK Gypsum Panels, in exterior walls and ceilings with foil surface applied next to framing.

Limitations: (1) In order to attain fire resistance ratings with ⅝″ BAXBORD FIRECODE backing board, the construction must be

Specifications—Coreboard, Backing Board & R.H. Base

Panel Type	Coreboard	BAXBORD Backing Board						R.H. Base	
Thickness	1″	⅜″		½″			⅝″	½″	⅝″
Lengths	8′ to 12′	8′	8′, 12′	8′		8′, 12′	8′	8′ to 12′	
Width	24″	24″	48″	24″		48″	24″	48″	
Edges	V-T&G	Square		Square	V-T&G	Square	V-T&G	Rounded	
Approx. Wt. (lbs./MSF)	4,150	1,475		1,875			2,375	1,970	2,470

Panel Type	Foil-Back BAXBORD				BAXBORD FIRECODE		Foil-Back BAXBORD FIRECODE	
Thickness	⅜″	½″		⅝″	⅝″		⅝″	
Lengths	8′	8′		8′	8′		8′	
Width	24″, 48″	24″, 48″	24″	24″	24″	48″	24″	48″
Edges	Square	Square	V-T&G	V-T&G	V-T&G	Square	V-T&G	Square
Approx. Wt. (lbs./MSF)	1,500	1,900		2,400	2,475		2,500	

in accordance with floor or roof ceiling design listed by Underwriters' Laboratories, Inc. (see Chapter 4). (2) Where ½″ or ⅝″ BAXBORD is to be used as acoustical tile base, store acoustical tile and base in a dry area protected from the elements. Provide flat, solid support during storage. Take necessary precautions to prevent condensation in storage area and within the structure in which acoustical base is applied.

USG R.H. Base is a specially fortified gypsum panel used with SHEETROCK R.H. Filler in electric cable ceilings. The system improves heat emission and resistance to heat deterioration. Base is nailed or screw-applied to wood joists; screw-applied to USG Metal Furring Channels or RC-1 Resilient Channels. Available in plain core, ½″ and ⅝″ thickness; also in Type X core and ½″ thickness. U.L. listed.

USG Gypsum Sheathing is a fireproof gypsum board with an asphalted gypsum core encased in specially formulated brown water-repellent paper on both sides and long edges. Its weather resistance, water repellence, fire resistance and low applied cost make it suitable for use in exterior wall construction of garden apartments and light commercial buildings as well as in homes.

USG Gypsum Sheathing is ideal for a wide range of exterior finishes—masonry veneer, wood clapboard and aluminum siding, wood and asbestos shingles, and stucco—applied by nailing through the sheathing into the framing. Sheathing can be painted if desired after six months' exposure to the weather. Also used as an economical utility siding for farm buildings, tobacco barns and similar buildings not needing a decorative exterior finish.

Available in two types: 24″ wide, 8′ length, with V-shaped T&G long edges, normally applied horizontally with concave "V" toward the base, and 48″ wide, 8′ and 9′ lengths with square edges, applied vertically to meet FHA requirements for omission of corner bracing with wood framing. Other features:

Fire Protection—The asphalted gypsum core is incombustible and will not transmit high temperatures until completely calcined. USG Gypsum Sheathing is the only commonly used type of sheathing that is fire resistant.

Weather Resistance—The heavy brown paper covering actually sheds water, permitting open storage on the job and exposure on the framing. Building paper not required except where codes require it over all sheathing. Complies with water resistance requirements of ASTM designation C79. Tight joints minimize wind and rain penetration.

Low Applied Cost—Sheathing is quickly cut or scored and snapped, waste is negligible, application faster than with plywood or wood sheathing.

Structural Strength—Superior in bracing and stiffening. Tests have shown lateral distortion of only .498″ under a racking load of 1,850 lbs.

Insulation Value—Possesses thermal conductance of 2.48, thermal resistance of 0.40. Combined with THERMAFIBER Insulating Wool blankets in an exterior wall assembly, a low "U" factor of .11 can be obtained.

Vapor Permeability—Average of 27.3 perms permits escape of moisture, minimizing rotting of framing. For effective vapor control, should be used in combination with Foil-Back SHEETROCK Gypsum Panels or BAXBORD Backing Board, or with THERMAFIBER Silver Shield Insulating Wool.

Limitations: (1) Not to be considered a vapor barrier. (2) Must not be stored in the open for more than one year unless fully protected. (3) Must be applied face out (back paper laps over face paper at edges and back of panel bears date code). After sheathing has been applied to framing, it must not be exposed to the weather for more than one year before exterior finish is applied. (4) Exterior finishes—wood siding, wood furring strips, stuccomesh, wall ties, etc.—must be secured to the framing by fastening through the sheathing. (5) Not recommended as a base for ceramic tile—use SHEETROCK W/R Gypsum Panels. (6) With 2'x8' size, diagonal corner braces should be installed at all external corners.

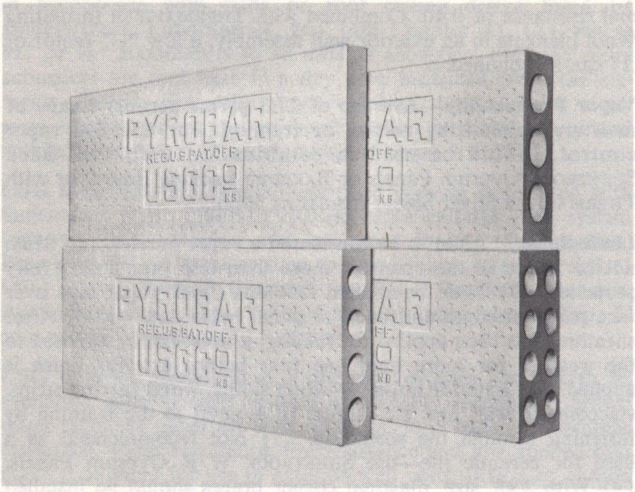
Specifications—USG Gypsum Sheathing

Size	Nom. Thick-ness	Type Edge	Max. Framing Spacing	Approx. Wt. per MSF (lbs.)	Insul. Value	Meets Federal Specs.
2'x8'	½"	T&G	24"	2,000	1.43(k)	SS-L-30c, Type II, Grade W, Class 2 SS-S-276
4'x8'	½"	Sq.	16"	2,000	1.43(k)	ASTM C79 FHA Tech. Circ. No. 12 (4'x8' and 4'x9' sizes only)
4'x9'	½"	Sq.	16"	2,000	1.43(k)	

For Thermal Transmission values, see chart page 258.

USG FIRE FIGHTER Gypsum Board is a backing board used as a fire barrier over wood framing and beneath plywood or spaced wood sheathing in combustible roof construction. It significantly retards spread of fire originating within the structure and resists fire penetration through the roof covering. Made with fire-resistive Type X core encased in water-repellent, ivory manila face paper and heavy brown back paper. Fire hazard classification: flame spread 20, fuel contributed 5, smoke developed 0. Available with square edges, ½" thick, 24" wide and 8 ft. long.

PYROBAR Gypsum Tile is a precast kiln-dried gypsum tile that is easily laid up with gypsum mortar to make non-load bearing column fireproofing and interior partitions. A base of 2" solid or 3" hollow PYROBAR with SHEETROCK FIRECODE Gypsum Panel facing affords a fire rating of 4 hours as column fireproofing. PYROBAR is machine molded into large, lightweight units 12"x 30" in size. It is easily cut, handled and quickly installed using



RED TOP Partition Tile Cement and sand as mortar. Units weigh 30% to 50% less and require fewer joints and mortar than other commonly used masonry units.

Thickness: 2″ solid, 3″ hollow for column fireproofing; 3″ solid and 3″, 4″ and 6″ hollow for partitions.

Specifications—PYROBAR Gypsum Tile

Product	Approx. Tile Wt. (psf)	RED TOP Partition Tile Cement (100-lb. bags/MSF)	Sand (cu. ft./MSF)
2″ solid	10	5	15
3″ solid	14.5	8	24
3″ hollow	10	8	24
4″ hollow	12.5	10	30
6″ hollow	20.5	15	45

PYROBAR Gypsum Tile complies with Fed. Spec. SS-T-00316a and ASTM C52.

trim accessories

USG trim accessories—corner reinforcements, casing beads, metal trims, control joints and decorative moldings—enjoy the industry's top acceptance because of their dependability and continual improvement in design.

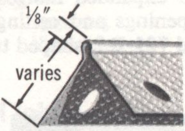
corner reinforcement

USG corner beads provide true and straight lines for smooth finishing at outside gypsum panel corners. The exposed bead also helps prevent damage from impact.

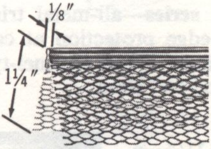
DUR-A-BEAD is an all-metal heavy gauge hot-dipped galvanized steel reinforcement for protecting external corners. It is nailed to framing through gypsum panels and concealed with U.S.G. joint compounds for smooth, finished corners. Available in two flange widths:

No. 101 1"x1"; **No. 103** 1¼"x1¼". Also available in lighter gauge **ECONO** models: **Standard** 15/16"x15/16"; **No. 102** 1"x1¼"; **No. 103** 1¼"x1¼"; **No. 104** 1⅛"x1⅛".

No. 900 Corner Bead is a galvanized steel external corner reinforcement with 1¼" wide fine-mesh expanded flanges. Nailed or stapled to framing through gypsum panels; provides superior key for joint compounds and eliminates shadowing.



DUR-A-BEAD

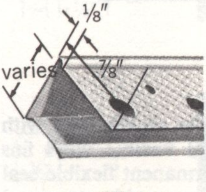


No. 900 Corner Bead

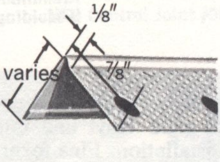
metal trim

USG Metal Trims provide maximum protection and neat finished edges to gypsum panels at window and door jambs, at ceiling angles and at intersections where panels abut other materials. Easily nailed through the channel and panels into the framing. Eliminate precision cutting and mitering with simply butted joints. The No. 200 series is finished with U.S.G. joint compounds. Made in three types, ten sizes:

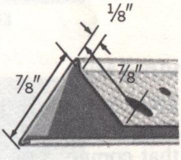
No. 200 series—steel casing, includes **No. 200-A** U-shaped channel in ½" and ⅝" sizes; **No. 200-B** L-shaped angle edge trim without back flange to simplify application, in ½" and ⅝" sizes; **No. 200-C** L-shaped trim, requires slotted jamb for installation in most cases, open "V" edge of flange inserts into kerf to make trim adjustable for use with ⅜", ½" and ⅝" gypsum panels.



200-A
Metal Trim

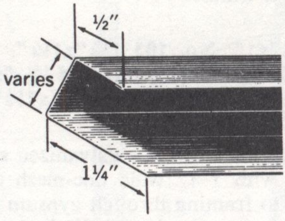


200-B
Metal Trim



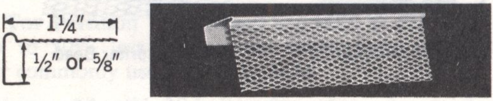
200-C
Metal Trim

No. 400 series—reveal type all-metal trim, requires no finishing compound, includes No. 400 in ⅜″ size, No. 401 in ½″ size, No. 402 in ⅝″ size.

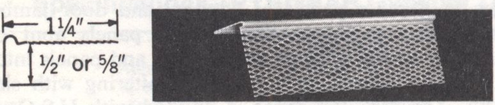


400 Series
USG Metal Trim

No. 701 series—all-metal trim with expanded flanges used to provide edge protection at cased openings and ceiling or wall intersections. 701-A channel-type and 701-B L-shaped trim, both in ½″ and ⅝″ sizes.

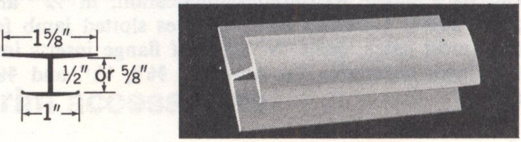


701-A
Metal Trim



701-B
Metal Trim

Aluminum H-Molding—supports and conceals end joints in exterior ceiling board assemblies; ½″ and ⅝″ sizes.



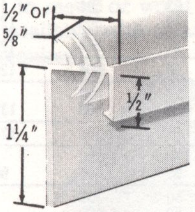
Aluminum
H-Molding

vinyl trim

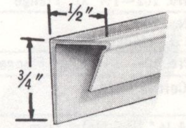
USG P-1 Vinyl Trim is a reveal type, white plastic trim with flanges and web of rigid vinyl and integral flexible vinyl fins that compress on installation. Fins form permanent flexible seal to effectively block sound, replace caulking, provide structural stress relief at gypsum panel perimeter. Fits tightly over panel

edge; requires no finishing compound; paints easily; includes P-1A in ½" size, P-1B in ⅝" size.

USG P-2 Vinyl Trim, a channel-shaped vinyl trim with pressure-sensitive adhesive backing for attachment to wall at wall-ceiling intersections. Provides positive perimeter relief in radiant heat ceilings. Requires no finishing compound; paints easily.



USG P-1
Vinyl Trim



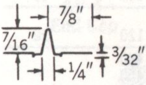
USG P-2
Vinyl Trim

control joints

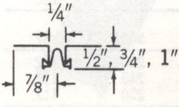
USG Control Joints are designed to relieve stresses of expansion and contraction transverse to the joint in large ceiling and wall areas. Made from roll-formed zinc with a ¼" open slot protected with plastic tape which is removed after finishing. Highly resistant to corrosion in interior and exterior uses. *Note:* USG Control Joints should not be used with magnesium oxychloride cement stuccos or stuccos containing calcium chloride additives.

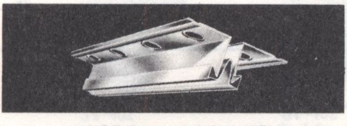
USG Control Joint No. 093—used for interior applications from floor to ceiling in long partitions and wall furring runs and from door header to ceiling or from wall to wall in large ceiling areas. Staple-applied to panel face; finished with joint compound.

USG Control Joint No. 75—used in radiant heat ceiling systems to minimize surface cracking.



USG Control Joint #093





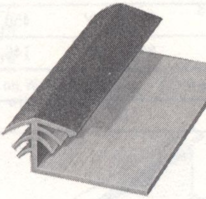
USG Control Joint #75

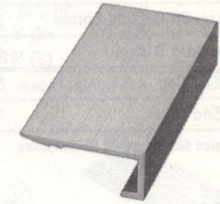
Specifications—Trim Accessories

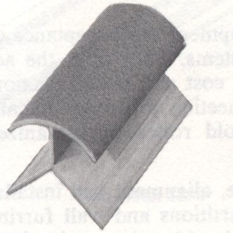
Product	Length	Pcs. per Ctn.	Lin. Ft. per Ctn.	Approx. Wt. Lbs./MLF
No. 101 DUR-A-BEAD (200′ ctns.) 1″x1″ Flange	6′ 8″ 6′10″ 8′, 10′	30 30 25, 20	200 205 200	114
No. 101 DUR-A-BEAD (500′ ctns.) 1″x1″ Flange	6′ 8″ 6′10″ 8′ 10′	75 75 63 50	500 513 504 500	114
No. 103 DUR-A-BEAD 1¼″x1¼″ Flange	8′ 10′	63 50	504 500	123
ECONO Std. 15⁄16″x15⁄16″ Flange	8′	63	504	120
ECONO No. 102—1¼″x1″ Flange	8′	63	504	120
ECONO No. 103 1¼″x1¼″ Flange	8′ 10′	63 50	504 500	135
ECONO No. 104—1⅛″x1⅛″ Flange	8′	63	504	121
No. 900 Corner Bead	8′ 10′	60 60	480 600	90
No. 200-A ½″ USG Metal Trim U-shaped	7′ 8′ 10′	50 50 50	350 400 500	108
No. 200-A ⅝″ USG Metal Trim U-shaped	7′ 8′ 10′	50 50 50	350 400 500	117
No. 200-B ½″ USG Metal Trim L-shaped	7′ 8′ 10′	50 50 50	350 400 500	84
No. 200-B ⅝″ USG Metal Trim L-shaped	7′ 8′ 10′	50 50 50	350 400 500	91
No. 200-C USG Metal Trim L-shaped	7′ 10′	50 50	350 500	106
No. 400 ⅜″ USG Metal Trim Reveal Type	7′ 8′ 9′ 10′	50 50 50 50	350 400 450 500	150
No. 401 ½″ USG Metal Trim Reveal Type	7′ 8′ 9′ 10′	50 50 50 50	350 400 450 500	157
No. 402 ⅝″ USG Metal Trim Reveal Type	7′ 8′ 9′ 10′	50 50 50 50	350 400 450 500	165
No. 701-A ½″ USG Metal Trim Channel Type	7′ 10′	50 50	350 500	98
No. 701-A ⅝″ USG Metal Trim Channel Type	7′ 10′	50 50	350 500	106
No. 701-B ½″ USG Metal Trim L-shaped	10′	50	500	74
No. 701-B ⅝″ USG Metal Trim L-shaped	10′	50	500	80
Aluminum H-Molding	12′	10	120	20
USG P-1A Vinyl Trim Reveal Type	8′ 9′ 10′	50 50 50	400 450 500	100
USG P-1B Vinyl Trim Reveal Type	8′ 9′ 10′	50 50 50	400 450 500	105
USG P-2 Vinyl Trim Reveal Type	10′	50	500	37
USG Control Joint #75	10′	25	250	192
#093	8′	30	240	112
#093	10′	25	250	112

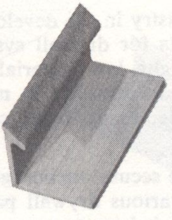
TEXTONE moldings

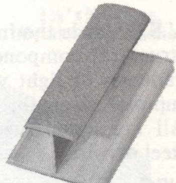
TEXTONE Moldings cover joints and edges, protect corners in pre-decorated panel installations. Precision-made of extruded aluminum, vinyl plastic and steel with vinyl-laminated surfaces to match TEXTONE Panels. Available in ⅜", ½", and ⅝" sizes; 8', 9' and 10' lengths; easily cut and mitered. PV-1 and AV-46 ceiling trims are designed for use with TEXTONE Smoothwall Panels. AV-5 and AV-7 types are pre-punched for screw attachment to metal or wood framing. Extruded aluminum moldings also available with clear anodized finish where vinyl surface is not required.

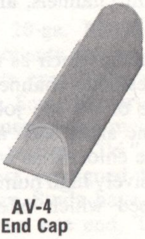

PV-1
Rigid Vinyl Casing

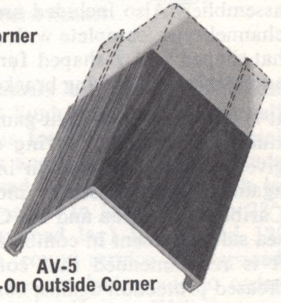

AV-46
Ceiling Drive-In Trim

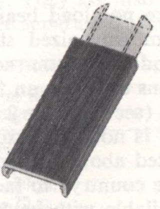

AV-1
Outside Corner

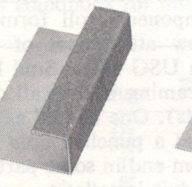

AV-2
Inside Corner

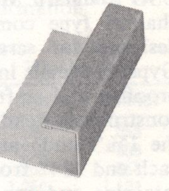

AV-3
Divider


AV-4
End Cap


AV-5
Snap-On Outside Corner


AV-7
Snap-On Batten


SV-401
End Cap


SV-402
End Cap

Specifications—TEXTONE Moldings

Product	Size	Length	Approx. Wt. Lbs./MLF
PV-1 Rigid Vinyl Casing	½″	8′, 9′, 10′	110
AV-46 Ceiling Drive-In Trim	½″	12′	154
AV-1 Outside Corner	⅜″, ½″, ⅝″	8′, 9′, 10′	234, 260, 286
AV-2 Inside Corner	⅜″, ½″, ⅝″	8′, 9′, 10′	135, 150, 165
AV-3 Divider	⅜″, ½″, ⅝″	8′, 9′, 10′	198, 220, 243
AV-4 End Cap	⅜″, ½″, ⅝″	8′, 9′, 10′	158, 175, 193
AV-5 Snap-On Outside Corner	(1)	8′, 9′, 10′	450, 500, 550
AV-7 Snap-On Batten	(1)	8′, 9′, 10′	146, 162, 178
SV-401 End Cap	½″	10′	157
SV-402 End Cap	⅝″	10′	165

(1) One size fits all panel thicknesses.

structural accessories

U.S.G. leads the industry in the development and acceptance of structural components for drywall systems. They offer the advantages of light weight, low material cost and quick erection, superior strength, and versatility in meeting job requirements. All are incombustible, made from cold rolled or galvanized steel or wire.

USG runners provide secure anchorage, alignment and installation economies for various drywall partitions and wall furring assemblies. Also included are two non-load bearing studs of the channel type, complete with runner tracks and screws as needed; hat-shaped and Z-shaped furring and resilient channels, and an adjustable wall furring bracket.

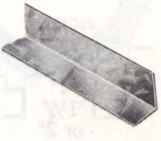
It is important that light-gauge metal components such as metal studs and runners, furring channels and resilient channels be given adequate protection in the warehouse or on the job site against rusting caused by moisture. In marine areas such as the Caribbean, Florida and the Gulf Coast where chloride as well as sea salt is present in combination with excessively high humidity, it is recommended that components be used which offer increased protection against corrosion.

USG Standard Metal Studs and Runners are non-load bearing channel type components roll formed from galvanized steel, designed for screw attachment of ½″ and ⅝″ SHEETROCK Gypsum Panels in USG Metal Stud Partitions and column fireproofing and as framing in drywall ceilings (see Chapter 2 for construction details). One end of each stud is notched (except the 1⅝″ stud) and a punched hole is located about 12″ from each end (24″ from end in some parts of the country) to facilitate pipe and conduit installation—also available with keyhole cutouts in selected markets. Studs comply with ASTM C645.

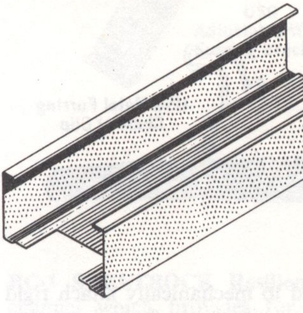
Runners have 1″ unhemmed legs; 12′ length. Packaged 10 pcs. per bdl.; available as follows:

Stud or Runner Designation	Width	Stud Length	Wt. Lbs./MLF	
			Stud	Runner (1″ Leg)
#158 Standard	1⅝″	8′, 9′	355	240
#200 Standard	2″	8′, 9′, 10′, 12′	382	273
#212 Standard	2½″	8′, 9′, 10′, 12′	419	291
#300 Standard	3″	8′, 9′, 10′, 12′	455	342
#314 Standard (1)	3¼″	Up to 16′ (2)	473	386
#358 Standard	3⅝″	8′, 9′, 10′, 12′, 16′	501	368
#400 Standard	4″	Up to 16′ (2)	528	394
#600 Standard	6″	Up to 16′ (2)	674	530

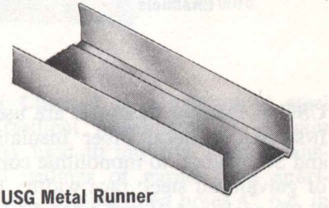
(1) Available on West Coast only. (2) Not stocked. Made to order only.
Studs comply with ASTM C645.



1⅜″x⅞″-24 ga. Metal Angle Runner



USG Metal Stud



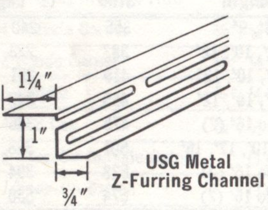
USG Metal Runner

USG 20-ga. Metal Studs and Runners are strong structural components for use in USG Metal Stud Partitions where wall heights exceed the allowable heights for USG Standard Metal Studs. See Chapter 4 for properties and limiting heights. Studs and runners are made from galvanized steel and are available in three widths—2½″, 3⅝″ and 6″—studs in lengths up to 28′; runners (designed with 1¼″ unhemmed leg) in 10′ and 12′ lengths. Studs have one 1¼″ diam. round service hole spaced 8″ from one end. These items are not stocked; made to order only. They are also used in USG Exterior Curtain Wall Systems—see separate Curtain Wall Handbook for information.

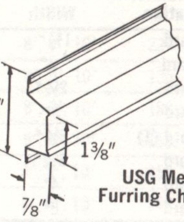
Stud or Runner Designation	Width	Wt. Lbs./MLF	
		Stud	Runner
#212—20 ga.	2½″	767	655
#358—20 ga.	3⅝″	918	805
#400—20 ga.	4″	968	888
#600—20 ga.	6″	1,250	1,124

Comply with Fed. Specs. QQS-698 and QQS-775d, class d.

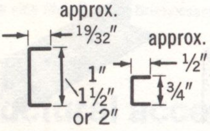
USG Metal Angle Runners are 1⅜″x⅞″x24-ga. galvanized steel angle sections used to secure and brace 1″ coreboard in USG Vent Shaft solid partitions. Length: 10′; packaged 10 pcs. per bdl.; weight: 217 lbs./MLF.



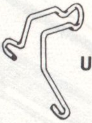
USG Metal Z-Furring Channel



USG Metal Furring Channel



USG Cold Rolled Channels



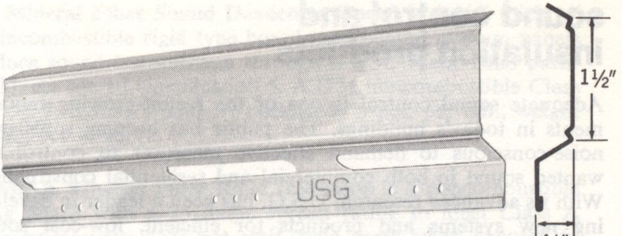
USG Metal Furring Channel Clip

USG Z-Furring Channels are used to mechanically attach rigid INSO-BAK Mineral Fiber Insulation or plastic foam insulation and SHEETROCK to monolithic concrete and masonry walls. Made of galvanized steel; face width: 1¼″; furring depth 1″; length: 8′-6″; packaged 25 pcs. per bdl.; weight: 213 lbs./MLF.

USG Metal Furring Channels are ceiling and wall furring channels made of galvanized steel designed for attachment of ½″ and ⅝″ SHEETROCK Gypsum Panels with USG Brand Screws Type S. Face width: 1⅜″; furring depth: ⅞″, length: 12′, packaged 10 pcs. per bdl.; weight: 292 lbs./MLF.

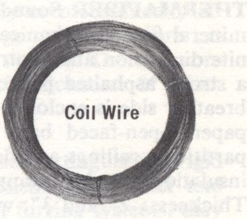
USG Furring Channel Clips are made of galvanized wire and used in attaching Metal Furring Channels to 1½″ cold-rolled runner channels. They are installed on alternate sides of the carrying channels; where clips cannot be alternated, wire tying is recommended. Packaged 500 pcs./ctn.; weight: 36 lbs./M pcs.

USG Cold-Rolled Channels, made of 16-ga. steel, are used for furring, and in suspended ceilings and partition construction. Available either galvanized or black asphaltum painted. Sizes: ¾″, with ½″ flange; 1½″, with 19⁄32″ flange; 2″, with 19⁄32″ flange. Lengths: 16′ and 20′; packaged 20 pcs. per bdl. in ¾″ size, 10 pcs. per bdl. in 1½″ and 2″ sizes; weight: ¾″-300 lbs./MLF, 1½″-500 lbs./MLF, 2″-629 lbs./MLF.



RC-1 Resilient Channel

USG
Adjustable Wall
Furring Bracket



Coil Wire

Hank Wire

RC-1 SHEETROCK Resilient Channel is a galvanized steel channel which provides for resilient attachment of gypsum panels to wood framing. Widely used to improve sound transmission loss in partitions and ceilings of garden-type apartments, motels and other structures. Pre-punched holes 4″ o.c. in the flange facilitate screw fastening to framing members; SHEETROCK is attached to channel by USG Brand Screws Type S. Width: 2¾″; depth: ½″; length: 12′; packaged 20 pcs. per bdl.; weight: 220 lbs./MLF. *Limitation:* not to be installed beneath highly flexible wood floor joists. RC-1 Channels are attached to ceilings with 1¼″ USG Brand Screws Type W or S—nails must not be used; see Framing Requirements, Chapter 2.

USG Adjustable Wall Furring Brackets are used for attaching ¾″ furring channels and Metal Furring Channels to exterior masonry walls. Made of 20-ga. galvanized steel with serrated edges, they are wire-tied to horizontal stiffeners, 24″ o.c., in braced furring systems: fur out board ¼″ to 2¼″ plus channel depth. Packaged 500 pcs. per ctn., weight 52 lbs. per M pcs.

USG Galvanized Tie and Hanger Wire—9-ga. wire, for hanging 1½″ and 2″ runner channels in suspended ceilings, is available in 50-lb. coils. 16-ga. and 18-ga. soft annealed wire, used for wall furring and to tie furring channels to runner channels in ceiling construction, is available in 50-lb. coils and 25-lb. hanks (28″ straight lengths).

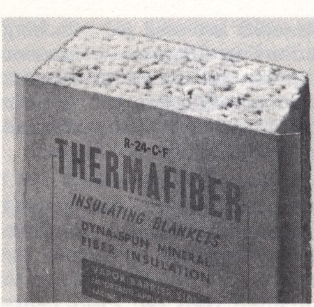
sound control and insulation products

Adequate sound control is one of the fastest-growing requirements in today's buildings. The public has become sufficiently noise-conscious to demand effective measures to control unwanted sound in both commercial and residential construction. With its advanced research, U.S.G. has been a leader in developing new systems and products for efficient, low-cost sound control for all types of new construction and remodeling.

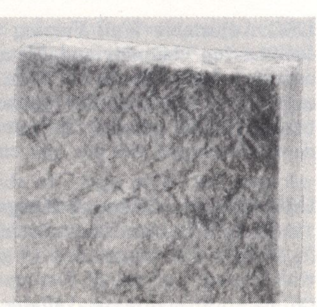
THERMAFIBER Sound Control (Regular) Blankets consist of mineral fibers mechanically formed into a uniform mat of definite dimension and controlled density. One side is enclosed with a strong asphalted paper which also forms nailing flanges. The breather side is enclosed in a durable fire-resistant, porous kraft paper; open-faced batts also available. Used in wood-framed partitions, ceilings and floors for improved sound resistance and insulation. Blankets comply with Fed. Spec. HH-I-521D Type II. Thickness: 2″ and 3″; width: 15″, 19″, 23″; length: 4′, 8′, 24′.

THERMAFIBER Sound Attenuation Blankets are paperless, semi-rigid mineral fiber blankets of uniform dimension and controlled density especially developed for metal stud and laminated gypsum partititions. When inserted in the partition cavity from floor to ceiling, these blankets help provide excellent fire ratings and substantially improve STC ratings of partitions. Easily handled and cut; simple to install. Fire hazard classification: flame spread 25, fuel contributed 20, smoke developed 0. Blankets comply with Fed. Spec. HH-I-521D Type I. Thickness: 1″, 1½″, 2″; width: 16″ and 24″; length: 48″.

USG Wood Fiber Sound Deadening Board, a ½″ thick, 4′ wide, low-density board, is used behind gypsum panels to reduce sound transmission through a wood stud partition. This structural board is easily nailed to 2x4 wood studs and provides a resilient base, limited to interior uses only. Gypsum panel face layer must be permanently nailed. Not recommended as a base layer in radiant heated ceilings. Complies with Fed. Spec. LLL-I-535 Class A and ASTM C208 Class A. Lengths: 4′, 8′, 10′ and 12′; packaged 6 pcs. per bdl.; weight: 750 lbs. per M sq. ft.



THERMAFIBER Regular Blanket



THERMAFIBER Attenuation Blanket

USG Mineral Fiber Sound Deadening Board is a ½″ thick, 4′ wide incombustible rigid type board used behind gypsum panels to reduce sound transmission through a USG Metal Stud partition. Flame spread classification 5, ASTM noncombustible Class A rating. Lengths: 8′ and 9′, packaged: 6 pcs. per bdl., weight 1030 lbs. per M sq. ft.

INSO-BAK Mineral Fiber Rigid Insulation is a noncombustible furring board with a 25 flame spread rating to meet Class A code requirements; does not emit toxic gases when exposed to fire. Used in drywall exterior wall furring systems with Regular or Foil-Back SHEETROCK Panels adhesively or mechanically attached. Not recommended for cold storage areas or where exposed to excessive moisture or continued wetting. Thermal conductivity (k): .031; density: 15 to 18 pcf; thickness: 1″; size: 24″x96″.

Plastic Foam Insulations are low density, self-extinguishing rigid boards having high strength and good resistance to water and water vapor. Used in drywall exterior wall furring systems, they are bonded directly to masonry surfaces and provide an excellent base for SHEETROCK Gypsum Panels. Boards are lightweight, non-flaking, non-irritating; easily handled and installed. Manufactured by Dow Chemical Company. Available in four types: STYROFOAM® SM and STYROFOAM FR, extruded polystyrene; DORVON® FR-100, molded expanded polystyrene; THURANE® urethane rigid foam insulation. Physical properties and specifications:

Specifications—Plastic Foam Insulation

	STYROFOAM SM	STYRO-FOAM FR	DORVON FR-100	THURANE
Density—pcf	2.2	1.8	1.0	1.9
Water Vapor Transmission—perm-inch	0.60	1.0	3.0	1.5
Thermal Conductivity-"k"(1)	0.20	0.26	0.26	0.15
Thickness—in.(2)	¾, 1, 1¼, 1½, 2	1, 1½, 2	1, 1½, 2	¾, 1, 1½, 2
Width—in.	24	16 24	16, 24, 48	16, 24, 48
Length—ft.	8	9 8	8	4, 8, 9

(1) Btu-in./sq. ft.—hr. °F. at 75° average mean temperature.
(2) Greater thicknesses are available.

USG Acoustical Sealant is a highly elastic, water-base caulking for sound-rated partition and ceiling systems. It is applied around cut-outs and around perimeter of partitions and ceilings to prevent leaks and transmission of airborne sound. Non-bleeding and staining, pumpable and easily applied in beads. Provides excellent adherence to most surfaces, permanent flexibility and long-lasting seal. Available in ¼-gal. disposable cartridges and 5-gal. bulk containers.

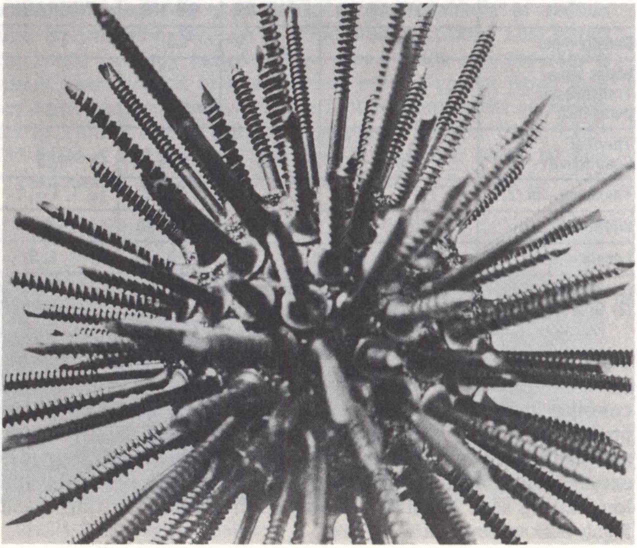
fasteners and adhesives

USG Brand Screws are the result of many years of development aimed at producing the best possible attachment of SHEETROCK Gypsum Panels to steel, wood or gypsum supports simply and quickly. A complete line of 22 different self-drilling, self-tapping steel screws is available to improve construction systems and simplify installation methods. All drywall screws are highly corrosion-resistant and have a Phillips head recess for easy installation with a special bit and power-driven screw gun. Panels are fastened to: 25-ga. (max.) steel framing with Type S screws, 12-ga. (max.) steel framing with Type S-12 screws, wood framing with Type W screws, gypsum backing boards and coreboards with Type G screws and adhesive.

The patented bugle head spins the face paper of the gypsum panel into the cavity under the screw head and produces a uniform depression free of fuzz for proper and easier spotting. Defects due to excessive or improper nail dimpling are eliminated. Other head designs are available for the assembly of metal framing and installation of wood and metal trim.

Type S screws have a patented milled drilling point and special threads that provide greater holding power, 35% to 50% faster penetration with 40% less driving torque than conventional drywall screws. These factors mean more screws can be driven per day and screw guns last longer. Special threads are also provided on Type G and Type W screws to speed installation and provide excellent holding power in gypsum or the various woods used in framing.

The ability of drywall screws to pull gypsum panels tightly to the framing without damaging the panels has virtually elimi-



nated loose panel attachment and consequent problems of "fastener pops" in wood frame construction. Tests have shown USG Brand Screws to have 100% greater withdrawal resistance than GWB-54 nails. Fewer screws than nails are generally required. Speed of installation compares favorably with nailing when electric screw guns (see Chapter 6) are used. An adjustable screw depth control assures uniformity of penetration, protects the face paper, minimizes core fracturing.

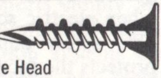
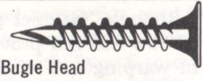
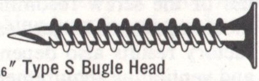
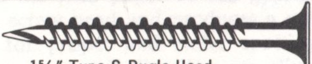
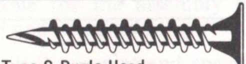
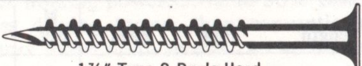
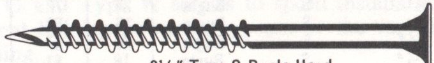
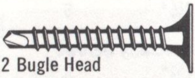
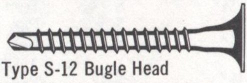
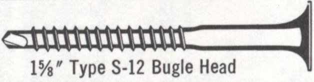
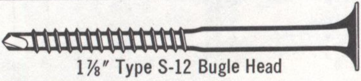
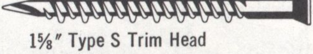
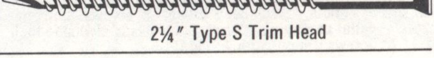
Although "fastener pops" caused by loose panels are eliminated, screws will not prevent "pops" due to excessive wood shrinkage or warping and twisting of framing. Correct selection and proper use of the screw recommended for the specific application are most important. Regardless of the attachment method used, satisfactory results also depend on meeting proper framing, heating and ventilating requirements (see Chapter 2).

Specifications—USG Brand Screws

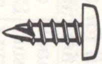
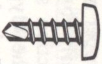
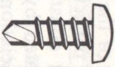
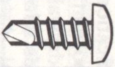
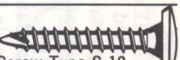
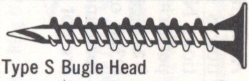
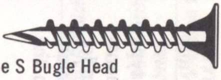
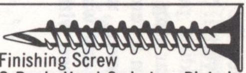
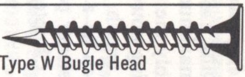
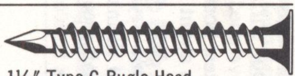
Description			Packaging				
			#1 Bulk with Bits			#3 Packages‡	
Length	Type	Head	M qty.	Lbs. wt.	No. of bits	M qty.	Lbs. wt.
Base Screws							
⅞″	S	Bugle	24	72	2	3	8⅔
1″	S	Bugle	16	53	2	2	6
1⅛″	S	Bugle	16	57	2	2	7
1¼″	S	Bugle	16	61	2	2	7½
1⁵⁄₁₆″	S	Bugle	16	66	2	2	7
1⅝″	S	Bugle	8	44½	2	1	5½
1⅞″	S	Bugle	8	47½	2	2	12*
2¼″	S	Bugle	4	30	2	1	7½*
Specialty Screws							
1⅝″	S	Trim	8	36	4	2**	9*
2¼″	S	Trim	8	53	4	2**	13*
⅜″	S	Pan	24	54	2	5	11*
⅜″	S	Hex Washer	24	54	0	5	11
⅜″	S-12	Pan	24	54	2	5	11*
½″	S-12	Pan	12	40	2	3	10*
½″	S-16	Pan(1)	—	—	—	3	10
1″	S-12	Bugle	16	52	2	2	6½
1¼″	S-12	Bugle	16	61	2	2	7½
1⅝″	S-12	Bugle	8	44	2	1	5½
1⅞″	S-12	Bugle	8	47	2	2	12*
2⅜″	S-12	Bugle	4	33	2	—	—
2⅝″	S-12	Bugle	4	39	2	—	—
1¼″	W	Bugle	16	60	2	2	8⅓
1½″	G	Bugle	8	45	2	2	11*
Finishing Screws							
⅞″	S-18	Oval(1)	16	64	2	2**	8
1¼″	S	Bugle(1)	16	61	2	1	4

(1) Cadmium Plated. ‡Also available in No. 2 Master Cartons, 4 or 8 pkgs. per ctn., same no. bits as in bulk. **Includes 1 bit per 2M screws. *Supplied in 4 pkgs. per Master Carton. Special pallet packaging in large quantities is available for 1″ Type S, 1¼″ S, 1¼″ W, and 1⅝″ S. Screws comply with ASTM C646.

Selector Guide for USG Brand Screws

Fastening Application	Fastener Used
GYPSUM PANELS TO STANDARD METAL FRAMING (1)	
½″ single-layer panels to standard studs, runners, channels	 ⅞″ Type S Bugle Head
⅝″ single-layer panels to standard studs, runners, channels	 1″ Type S Bugle Head
½″ double-layer panels to standard studs, runners, channels	 1⁵⁄₁₆″ Type S Bugle Head
⅝″ double-layer panels to standard studs, runners, channels	 1⅝″ Type S Bugle Head
1″ coreboard to metal angle runners in solid partitions	 1¼″ Type S Bugle Head
½″ panels through coreboard to metal angle runners in solid partitions	 1⅞″ Type S Bugle Head
⅝″ panels through coreboard to metal angle runners in solid partitions	 2¼″ Type S Bugle Head
GYPSUM PANELS TO 12-GA. (MAX.) METAL FRAMING	
½″ and ⅝″ panels and gypsum sheathing to 20-ga. studs and runners	 1″ Type S-12 Bugle Head
USG Self-Furring Metal Lath through gypsum sheathing to 20-ga. studs and runners	 1¼″ Type S-12 Bugle Head
½″ and ⅝″ double-layer gypsum panels to 20-ga. studs and runners	 1⅝″ Type S-12 Bugle Head
Multi-layer gypsum panels to 20-ga. studs and runners	 1⅞″ Type S-12 Bugle Head
WOOD TRIM TO INTERIOR METAL FRAMING	
Wood trim over single-layer panels to standard studs, runners	 1⅝″ Type S Trim Head
Wood trim over double-layer panels to standard studs, runners	 2¼″ Type S Trim Head

Selector Guide for USG Brand Screws

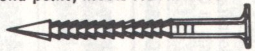
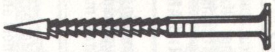
Fastening Application	Fastener Used
METAL STUDS TO DOOR FRAMES, RUNNERS	
Standard metal studs to runners	⅜″ Type S Pan Head Also available with Hex Washer Head 
Standard metal studs to door frame jamb anchor clips 20-ga. studs to runner Other metal-to-metal attachment (12-ga. max.)	 ⅜″ Type S-12 Pan Head
Standard metal studs to door frame jamb anchor clips (heavier shank assures entry in clips of hard steel)	½″ Type S-12 Pan Head 
Strut studs to door frame clips, rails, other attachments in ULTRAWALL partitions	½″ Type S-16 Pan Head Cadmium Plated 
TRIM AND ACCESSORIES TO METAL FRAMING	
Door hinges and trim to door frame Aluminum trim to metal framing (screw matches hardware and trim)	 ⅞″ Finishing Screw Type S-18 Oval Head Cadmium Plated
Metal base splice plates through panels and runner	 1¼″ Type S Bugle Head
Batten strips to standard metal studs in demountable partitions	 1⅛″ Type S Bugle Head
Aluminum trim to interior metal framing in Demountable and ULTRAWALL partitions	 1¼″ Finishing Screw Type S Bugle Head Cadmium Plated
GYPSUM PANELS TO WOOD FRAMING	
⅜″, ½″ and ⅝″ single-layer panels to wood framing	 1¼″ Type W Bugle Head
RC-1 RESILIENT CHANNEL TO WOOD FRAMING	
Screw attachment required for ceilings, recommended for partitions	1¼″ Type W, ⅞″ or 1″ Type S Bugle Head (see details above)
For fire-rated construction	1¼″ Type S Bugle Head (see details above)
GYPSUM PANELS TO GYPSUM PANELS	
Multi-layer adhesively laminated gypsum-to-gypsum partitions (not recommended for double-layer ⅜″ panels)	 1½″ Type G Bugle Head

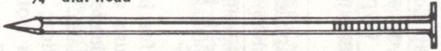
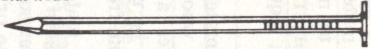
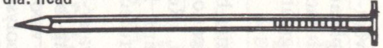
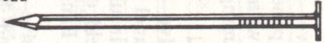
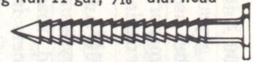
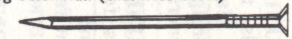
Notes: (1) Includes USG Standard Metal Studs, Metal Runners, Metal Angle Runners, Metal Furring Channels, RC-1 Resilient Channels. If channel resiliency makes screw penetration difficult, use screws ⅛″ longer than shown to attach panels to RC-1 channels. For 20-ga. Metal Studs and Runners, always use Type S-12 screws. For steel applications not shown, select a screw length which is at least ⅜″ longer than total thickness of materials to be fastened. USG Brand Screws are manufactured under U.S. Patent Nos. 2,871,752; 3,056,234; 3,125,923; 3,207,023; 3,221,588; 3,204,442; 3,260,100.

Gypsum Panel Nails have been vastly improved since the relationship of wood shrinkage to nail popping was discovered. Nails have been developed to concentrate maximum holding power over the shortest possible length—notably the annular ring type nail which has about 20% greater holding power than a cement-coated cooler type nail of the same length. However, under lengthy, extreme drying conditions, such as a cold dry winter, resulting wood shrinkage may cause fastener pops even with the annular ring nail (see Wood Shrinkage, Chapter 5).

As with screws, specification of the proper nail for each application is extremely important, particularly for fire-rated construction. Nails used in drywall construction should comply with performance standards adopted by the Gypsum Drywall Contractors International Association and ASTM Specifications C380 or C514. The nails shown below comply with these performance standards. Nails, except USG Matching Color Nails, are not available from U.S.G.

Selector Guide for Gypsum Panel Nails

Fastening Applications	Fastener Description	Nail Spacing c. to c. (1)	Approx. Lbs. Nails Req'd per MSF SHEETROCK
½", ⅜" and ¼" SHEETROCK Gypsum Panels; ½" and ⅜" BAXBORD Gypsum Backing Board to wood frame (2) (3)	1¼" GWB-54 Annular Ring Nail 12½ ga.; ¼" dia. head with a slight taper to a small fillet at shank; bright finish; medium diamond point; meets ASTM C380 	7" ceiling 8" walls	5¼
⅝" SHEETROCK Gypsum Panels to wood frame (3)	1⅜" Annular Ring Nail (Same as GWB-54 except for length) 	7" ceiling 8" walls	5¼

⅝″ SHEETROCK FIRECODE Gypsum Panels face layers to staggered wood studs over ½″ USG Wood Fiber Sound Deadening Board	2¼″ 7d Gypsum Panel Nail Cement Coated, 13 ga., ¼″ dia. head 	7″ walls (face layer)	9
⅜″ and ¼″ SHEETROCK Gypsum Panels over existing surface, wood frame	1⅞″ 6d Gypsum Panel Nail Cement Coated, 13 ga., 1¼″ dia. head 	7″ ceiling 8″ walls	6¼
⅝″ SHEETROCK FIRECODE Gypsum Panels to wood frame	1⅞″ 6d Gypsum Panel Nail Cement Coated, 13 ga., ¼″ dia. head 	6″ ceiling 7″ walls	6¾
½″ SHEETROCK FIRECODE "C" Gypsum Panels to wood frame	1⅝″ 5d Gypsum Panel Nail Cement Coated, 13½ ga., 15/64″ dia. head 	6″ ceiling 7″ walls	5¼
⅝″ SHEETROCK FIRECODE Gypsum Panels; ⅝″ BAXBORD FIRECODE Gypsum Backing Board to steel nailing channel	1¼″ Fetter Annular Ring Nail 11 ga., 5/16″ dia. head 	6″ ceiling	6
TEXTONE Vinyl Panels (27 finishes) to wood frame (3)	1⅜″ USG Matching Color Nail (Stainless Steel) 	8″ walls	2½
	1⅞″ USG Matching Color Nail (Stainless Steel) (Special Order)	8″ walls	4½

NOTES: (1) Spacing shown are for single layer application without adhesive. (2) See Wood Framing Requirements and Heating Recommendations, Chapter 2. (3) Nails shown for this application are also the proper size for use with adhesive.

DURABOND Drywall Adhesives make an important contribution to gypsum panel attachment where the finest room interiors are desired. Their use greatly reduces the nail or screw fastening otherwise required—saves labor in spotting and sanding; also minimizes nail pops and other fastener imperfections.

For laminating gypsum panels to gypsum backing board or coreboard in multi-layer fire-rated partitions, any DURABOND Joint Compound or PERF-A-TAPE Joint Compound-Taping may be used—powder products mixed with water and applied with a spreader. Temporary fasteners must be used. Provide tight bond when dry yet permit adjustment of board after contact.

Ready-to-use DURABOND Adhesives are available in five types for specific applications:

DURABOND 200 Adhesive—a solvent-base material, applied in ⅜″ beads, for gypsum panel application to metal or wood framing. May be used with Foil-Back SHEETROCK Gypsum Panels. Bridges minor framing irregularities; requires minimum field fasteners on ceilings.

DURABOND 300 Adhesive—a water-base material, applied in ⅜″ beads, for gypsum panel application to wood framing and polystyrene rigid foam insulation. Requires a minimum of permanent fasteners in field of board. May be used with Foil-Back SHEETROCK Gypsum Panels. Protect from freezing.

DURABOND 500 Adhesive—a water-base material for laminating gypsum panels and backing boards to gypsum coreboards, monolithic concrete block, wood-fiber sound deadening board, gypsum tile and expanded polystyrene or urethane rigid foam insulation. Allows board adjustment after erection; provides excellent bond after impacting. Field fasteners not required when panels are prebowed. Protect from freezing.

DURABOND 600 Adhesive—a water-base liquid adhesive for contact lamination of gypsum panels in non-fire rated double-layer systems. Roller applied, bonds tightly with impacting. Ceiling lamination requires a minimum of permanent fasteners. Protect from freezing.

DURABOND 700 Adhesive—a water-base material for applying TEXTONE Vinyl Wallcovering directly to vinyl surfaces. Eliminates stripping existing vinyl. Provides fast, firm adhesion and high pull-off resistance. Brush or roller applied. Protect from freezing.

For adhesive application of TEXTONE Gypsum Panels, only DURABOND Adhesives are recommended; other adhesives may not be compatible with the vinyl surface.

DURABOND Vinyl Foam Tape is a high-strength, pressure-sensitive tape used as a temporary fastener in conjunction with DURABOND Adhesives. Eliminates need for supplemental screw or nail fastening. For application of SHEETROCK or predecorated gypsum panels to wood or metal framing or to recommended existing wall surfaces such as gypsum backing board, sealed plaster, monolithic concrete or concrete block. Also used in double-layer gypsum panel wall assemblies. Tape is 1⁄32″ thick, 1½″ wide, 216 lin. ft. per roll. Packaged 7 rolls per carton, weight 15½ lbs. For application directions and specifications, see U.S.G. folder WB-1263.

Specifications—Drywall Adhesives

Type Adhesive	Item	Items per Package	Gross Wt. Lbs./Pkg.
DURABOND Joint Compounds—Taping, 90, XL	25-lb. bag	1 bag	25½
PERF-A-TAPE Joint Compound-Taping	25-lb. bag	1 bag	25½
DURABOND 200	5-gal. can ¼-gal. ctdgs.	1 can 12/ctn.	50 32
DURABOND 300	5-gal. can ¼-gal. ctdgs.	1 can 12/ctn.	47 32
DURABOND 500	5-gal. can	1 can	52
DURABOND 600	5-gal. can	1 can	44
DURABOND 700	5-gal. can	1 can	44

DURABOND 200 and 300 comply with ASTM C557.

DURABOND Adhesive Selector Chart

Base Surface	Applied Surface				
	SHEETROCK Gypsum Panels			TEXTONE Panels	Backing Board
	Reg.	Foil-Back	W/R		
SHEETROCK SW Gypsum Panels	600†			600	
SHEETROCK W/R Panels				600	
Foil-Back SHEETROCK Panels	600†			600	
Backing Board	600			600	
Gypsum Coreboard	500			500	
Sound Deadening Board (wood & min. fiber)	500			500	
Wood Studs, Joists and Furring	200 or 300	200	200 or 300	200 or 300	
Painted Surfaces (clean, smooth, sound)	500			500	
Unit Masonry (brick, stone, concrete block, concrete)	500		500	500	
PYROBAR Tile	500			500	
Metal Studs and Channels	200	200	200	200	200
Foam Insulation	500			500	500

†For fire rating, use DURABOND or PERF-A-TAPE Joint Compound-Taping.

joint treatment products

description

Today's complete U.S.G. joint treatment line includes fiber reinforcing tape and both ready-mixed and powder-type compounds. In addition to conventional joint finishing and fastener spotting, certain of these products are designed for repairing cracks, patching, spackling, back-blocking, for laminating gypsum panels in double-layer systems, and for embedding electric cable in radiant heated ceilings.

Made by the originator of modern joint finishing, U.S.G. joint treatment products have wider acceptance than all others for one reason: their over-all qualities produce the best, most uniform finished result.

Non-casein type **USG Brand Joint Compounds** are the latest in powder products. They offer almost instant solution and use after mixing, compared to the 30-minute or longer soak of casein-type compounds. Once mixed, they stay mixed, have smoother application properties and are free of objectionable

wet-mix odors. They have much greater shelf life—both in powder form and ready-mixed—than casein compounds.

Casein-type **PERF-A-TAPE Joint Compounds** have been the popular choice of professional applicators for years because of their reliable performance through well-balanced characteristics.

Hardening-type **DURABOND Joint Compounds** offer maximum bonding strength, minimum shrinkage and fast hardening for one-day finishing.

All three powder lines are offered with bag designs functionally coordinated and color-coded to simplify identification. USG Brand Joint Compounds are packaged in a crisp white bag; PERF-A-TAPE Compounds in a rich brown bag; DURABOND Compounds in a soft tan bag.

Ready-mixed type products, widely used for job-time and dollar savings, include **USG Ready-Mixed Joint Compound-All Purpose** and **Topping** which are preferred for uniform results on the job. **COVER COAT Drywall Compound** is applied direct to concrete ceilings for a smooth or textured finish.

SHEETROCK R.H. Filler is used for embedding and finishing over electric cable in radiant heated ceilings.

Joint treatment products meet ASTM Standards C474 and C475 and Federal Specification SS-J-570A–Type I for joint compounds only, Type II for tape only, Type III for combined joint compound and tape.

advantages

In U.S.G. joint compounds, these qualities of superiority have been developed:

Excellent Bond—hold tight under normal conditions.

Smoother Joints—joints can be pulled down very tight and finished with minimum or no sanding.

Smooth Working—easy mixing, excellent slip, ample wet-mix life; no alkali burning of paint. Allows fast preparation for decorating.

Use of U.S.G. joint treatment brings the important added advantage of dealing with a single manufacturer who is responsible for *all* components of the finished wall or ceiling—all made by U.S.G. to *work together*.

general limitations

1. For interior use only (except for USG Exterior Ceiling Board application—see DURABOND XL Joint Compound below).

2. Not intended for use on wood or wood fiber products (except in certain lamination applications—see PERF-A-TAPE Joint Compound below).

3. Protect bagged and cartoned products against wetting.

4. Each compound coat must be dry before next is applied (except for DURABOND Compounds–see below and application in Chapter 2).

5. Completed joint treatment must be dry before proceeding with decoration.

PERF-A-TAPE Reinforcement is a strong fiber tape specially designed with chamfered edges feathered thin. Special cross-fibered paper has great strength both with and across the grain of paper. Many small random perforations allow rapid air escape during embedding. Highly crack resistant. Lightly pre-creased for folding in corner application. Available in 60′, 250′, 500′ rolls. Comparative tests and long field usage have established other performance advantages of PERF-A-TAPE:

Strength—greatest cross tensile strength, producing joints as strong as the board itself.

Crack Resistance—wafer-thin edges permit easy embedding, with greater holding power to resist edge cracking.

Natural Bond—tape truly adheres to compound; spark perforations minimize photographing; tape has least longitudinal stretch.

USG brand joint compounds

These non-phosphoprotein (non-casein type) powder compounds retain all the desirable features of conventional casein-bound products. But because of better performance characteristics, including greater consistency and savings in mixing time, they are replacing the casein-type compounds. Not compatible with PERF-A-TAPE Joint Compounds, but they may be used with DURABOND Compounds and USG Ready-Mixed Compounds. They require a drying period after application.

USG Joint Compound-Taping is designed for embedding tape and for first fill coat on metal corner beads, trim and fasteners; also used for patching plaster cracks. Outstanding bond and resistance to tape cracking.

USG Joint Compound-Topping is a smooth-sanding material for second and third coats over taping compound. Produces excellent feathering and superior finishing results.

USG Joint Compound-All Purpose incorporates good taping and topping characteristics in a single product, for use where finest results of the specialized compounds (above) are not necessary. Also has good texturing properties.

PERF-A-TAPE joint compounds

These are phosphoprotein (casein-type) powder products noted for qualities of easy mixing, smooth working, ample working time, controlled minimum shrinkage and no alkali burning of paint. They require a drying period after application, and should not be used in combination with other compounds.

PERF-A-TAPE Joint Compound-Taping gives outstanding service in embedding tape, and as first fill coat over metal corners, trim and fasteners. Also used for patching plaster cracks, for laminating double-layer panel systems and in U.S.G. Back-Blocking System (see Chapter 2).

PERF-A-TAPE Joint Compound-Topping, used for finishing over PERF-A-TAPE Compound-Taping, has good workability, smoothness, paintability and long working life. Available either pigmented or unpigmented.

PERF-A-TAPE Joint Compound-All Purpose brings the convenience of single package joint treatment; does a most adequate job of taping, topping, and as a hand-applied texture.

DURABOND joint compounds

Polyindurate powder products develop their top performance through chemical hardening as opposed to drying-type compounds. They provide faster finishing of drywall interiors even under slow drying conditions. Rapid hardening permits same-day joint finishing and usually next-day decoration. Low shrinkage and superior bond are outstanding features. All DURABOND products are excellent for laminating gypsum panels to gypsum panels or to existing above-grade surfaces. Not compatible with casein-type compounds.

DURABOND Joint Compound-Taping is a hardening-type material for embedding tape fasteners and metal accessories. Also ideal for heavy fills because it chemically hardens in 3 to 4 hours. Virtually unaffected by humidity. *Limitation:* do not use as a finishing coat; always cover completely with final application of USG Ready-Mixed Joint Compound-All Purpose or Topping; USG Joint Compound-All Purpose or Topping.

DURABOND 90 Joint Compound is the required pre-fill material for SHEETROCK SW Panels, smoothing and strengthening joints between panels. Its 1 to 2-hour hardening time also makes it an ideal alternate to DURABOND Joint Compound-Taping in applications where quicker finishing is desired.

DURABOND XL Joint Compound is a distinctively superior product designed to treat joints, fasteners, drywall beads and trims, and areas requiring heavy fills in USG Exterior Gypsum Ceiling Board application. Hardens in 30 to 60 minutes; offers outstanding properties of bond, moisture resistance, edge-crack resistance and low shrinkage.

ready-mixed compounds

The finest and fastest growing joint compounds in the industry are ready-mixed compounds which are mixed by the manufacturer to a smooth, lump-free consistency. Ready-mixed compounds have superior crack resistance and ease of handling. They are all-purpose type products having better adhesion without excessive hardness for sanding. Vinyl-type binders give ready-mixed many of these properties.

USG Ready-Mixed Joint Compound-All Purpose is a drying type formulation widely used for embedding and finishing because of its uniform high quality. A factory-mixed product, it eliminates variable results often associated with job-mixed powder products. It protects against edge cracking and eliminates contamination from dirty water. Has a creamy, lump-free plasticity that produces excellent slip and bond. Available in either machine or hand tool consistency; on-the-wall cost averages the same as, or even less than, that of powder compounds. Recommended for finishing SHEETROCK SW Gypsum Panel joints over DURABOND 90 pre-fill coat and DURABOND Taping; also used in repairing cracks in interior plaster and masonry not subject to moisture. *Limitations:* must protect wet joints and container from freezing; not recommended for laminating.

USG Ready-Mixed Joint Compound-Topping is a vinyl-base finishing material with uniform high quality and workable consistency. May be used as a first coat over metal corners, trim and fasteners; produces smoother finish with less shrinkage and sanding than ready-mixed all-purpose compound. *Limitation:* protect wet joints and container from freezing.

COVER COAT Drywall Compound is a vinyl-base product, designed for filling and smoothing monolithic concrete ceilings and columns located above grade—no extra bonding agent needed. Supplied in ready-mixed form (sand can be added), easily applied with drywall tools in two or more coats. Dries to a fine white surface usually making further decoration unnecessary—if desired, COVER COAT is followed with SHEETROCK Sealer or TEXOLITE Primer-Sealer. *Limitations:* not to be applied over moist surfaces or surfaces likely to become moist (by condensation or otherwise), on ceiling areas below grade, on surfaces which project outside the building, or on areas subject to moisture, freezing, efflorescence, pitting or popping.

radiant heat filler

SHEETROCK R.H. Filler is a high-density, specially formulated product for embedding electric cables in radiant heated ceilings. Provides more efficient heat transmission and greater resistance to heat deterioration. Hand applied to embed cables to a total thickness of ¼". Used over special USG R.H. Base attached to wood joists, metal furring channels or suspended grillage, or over a bonding agent directly to monolithic concrete ceilings. U.L. listed.

Specifications—Joint Treatment Products

Product Description	Items per Package	Gross Wt. Lbs./Pkg.
PERF-A-TAPE Reinforcing Tape		
—500′ roll	10/ctn.	28
—250′ roll	20/ctn.	28½
—60′ roll	24/ctn.	10
USG Brand Joint Compound (powder)— 25-lb. bag		
—taping, topping or all-purpose	1	25½
PERF-A-TAPE Joint Compound (powder)— 25-lb. bag		
—taping, topping or all-purpose	1	25½
—5-lb. box compound (1)	10/ctn.	55
DURABOND Joint Compound (powder)— 25-lb. bag		
—taping, 90 or XL	1	25½
USG Ready-Mixed Joint Compound— All Purpose (paste)		
—5-gal. can	1	68
—4-gal. corrugated carton	1	53
—5-gal. corrugated carton	1	68
—5-gal. plastic pail	1	68
—1-gal. can	4/ctn.	58
Topping		
—5-gal. can	1	68
—5-gal. plastic pail	1	68
COVER COAT Compound (paste)		
—5-gal. corrugated carton	1	68
SHEETROCK R.H. Filler		
—50-lb. bag	1	50½
PERF-A-TAPE Joint System		
—250′ tape, 18 lb. compound (1) in bag	1	20
—60′ tape, 4½ lb. compound (1) in box (2)	10/ctn.	55

(1) All Purpose Compound. (2) Furnished with or without 1 plastic knife per box. Joint treatment products comply with ASTM Standards C474 and C475 and Fed. Spec. SS-J-570A—Type I for joint compounds only, Type II for tape only, Type III for combined joint compound and tape.

interior texture finishes

U.S.G., the unchallenged leader in texture finishes, offers the industry's broadest line. These outstanding texturing products are leading the resurgence of interior decoration.

Powder texturing products are:
USG Texture Paint; TEXTONE Texture Paint; IMPERIAL QT Texture Finish; USG Super Texture XII; USG Spray Texture; A-B TEX Texture, and U.S.G. Joint Compounds.

Paste texturing products are:
USG Spray Coat; DURACAL Interior Texture Finish; USG Textures I, II, VIII & IX, and USG Painter's Sanded Paste Stipple.

Tables on the following pages give complete information on their uses and finishes produced.

Selector Guide for USG Texturing Materials

PRODUCT	FINISH APPEARANCE	COVERAGE	COLOR	SPECIAL FEATURES	MAIN USE	APPLICATION
USG Texture Paint	Medium to light textures (not for light stipple finishes)	Up to 54 sq. ft./lb. (based on up to 14 pts. water per 10 lbs.)	White and colors (may be tinted; must be painted)	(1) Excellent finishes in medium to medium light textures (2) Permits high, sharp stipple	General interior use, lighter textures	Brush or roller
TEXTONE Texture Paint	Deep textures and patterns (virtually unlimited texture, tooling)	9 to 36 sq. ft./lb. (based on 1 pt. water per 1 lb.)	White only (may be tinted, should be painted, or may be sealed and glazed)	(1) Produces heavy stipples, rich textures, designs, patterns (2) Develops exceptional hardness and water resistance (3) Ideal for refinishing old walls, cracked surfaces	(1) Refinishing old, rough interiors (2) Unique effects, textures (3) Stencil work	Brush, roller, stippler, or other tools. (Priming usually not needed)
IMPERIAL QT Spray Texture Finish	"Acoustical Finish" appearance. Aggregated texture in varying degrees of coarseness: coarse, medium, fine	4 to 8 sq. ft./lb. 2 coats required for heavy coverage (based on 4 to 5 qts. water per 5 lbs. powder)	White only (not to be tinted)	(1) Excellent firmness (2) High bonding qualities (3) Good hiding of blemishes	Spraying an aggregated finish effect on drywall, concrete ceilings, and radiant heat fillers	Spray only
USG Super Texture XII	Sand-finish effect	Up to 35 sq. ft. walls, up to 20 sq. ft. ceilings (based on 2 to 3 gals. water per 25 lbs.)	Aggregated white only (not to be tinted. Walls are always to be painted—oil or latex)	(1) Good hiding of blemishes (2) Excellent base for paints (3) Very hard surface	Spraying a sand finish effect onto drywall surfaces, especially new work	Spray only. (Priming usually not needed)

USG Spray Texture	Wide range possible, from light texture to "orange peel" and splatter	Up to 35 sq. ft./lb. walls, up to 20 sq. ft. ceilings (based on 3 to 4 qts. water per 5 lbs.)	White only (do not tint, must be painted)	(1) Ideal for achieving a variety of texture effects by varying spray air and material pressure (2) Roller gives "orange peel" texture	General interior use	Spraying recommended. (May also be brushed or rolled—primer-sealer pre-coating recommended)
A-B TEX Texture	Patterns and textures of some depth (light to medium)	Up to 54 sq. ft./lb. walls, up to 27 sq. ft. ceilings (based on 3½ gals. water per 25 lbs.)	White only	(1) Economical for moderate textures (2) Easy application (3) Can be sprayed, brushed or rolled	General interior use	Brush or roller
Joint Compounds—Topping or All-Purpose	Patterns and textures of some variety and depth (light to medium)	Varies according to equipment and methods used. See Chapter 2 for mixing instructions	White (variable); must be painted. Sealer needed	(1) Fairly economical (2) Only one material needed on joint treatment jobs	General interior use (in connection with untreated wallboard joints)	Brush, roller or trowel
USG Spray Coat—Diamond Finish	Sand float finish with resistance to abrasion	Up to 125 sq. ft./gal.	Pastels & off-white only	(1) Produces high-build finish (2) Fast drying (3) Highly scrubbable (4) Abrasion-resistant	General interior use	Spray only—one coat, high-build
DURACAL Interior Texture Finish	Pronounced texture finish	Up to 75 sq. ft./gal.	White and custom colors	(1) Easy application (2) Excellent for covering minor blemishes (3) Moderately washable	General interior use	Spray only—one coat

continued on next page

Selector Guide for USG Texturing Materials—continued

PRODUCT	FINISH APPEARANCE	COVERAGE	COLOR	SPECIAL FEATURES	MAIN USE	APPLICATION
USG Texture I	Slight sand-finish effect with light under-texture	Up to 200 sq. ft./gal.	White and colors (may be tinted)	(1) Ready-to-use (2) No mixing necessary (3) Covers fine cracks, most spots and blemishes	General interior use over new and old painted or unpainted walls and ceilings	Brush or roller
USG Texture II	Flat ripple finish	Up to 200 sq. ft./gal.	White and colors (may be tinted)	(1) Ready-to-use (2) "Orange peel" to moderate ripple texture (3) Helps conceal moderate imperfections	Ideal for new drywall construction and most interior surfaces, painted or unpainted	Brush, roller or spray
USG Texture VIII	Sand-finish latex coating	Up to 200 sq. ft./gal.	White (may be tinted)	(1) Drywall spray surfacer (2) Usually covered with latex or oil-base paint	Use on unpainted drywall and most other interior wall and ceiling surfaces	Spray only
USG Texture IX	Heavy-bodied flat latex stipple	Up to 200 sq. ft./gal.	White (may be tinted)	(1) For professional applications (2) Ready-to-use	Interior use over new wallboard and plaster surfaces	Brush or roller
USG Painter's Sanded Paste Stipple	Sand-effect stipple	Up to 200 sq. ft./gal.	White (colored effects secured by over-painting)	(1) Ready-to-use (2) Paste form (3) Helps conceal sub-surface irregularities	Use on interior walls and ceilings, painted or unpainted	Brush or roller

texturing problems: their cause and remedy or prevention

USG texturing materials offer a wide range of decorative yet practical finishes. Properly used, they can provide interest and variety in decoration while covering minor defects in the base surface. However, certain working conditions, application techniques or equipment problems can cause unsatisfactory results. The following list describes the problem, probable cause and remedy for particular situations.

MIXING—lumping of wet mix

Cause: Too much water added to initial mix making lumps difficult to break up.

Remedy: Initial amount of water added to mix should be slightly less than recommended. After lumps are broken up, add remaining water.

MIXING—foreign objects in bagged material

Cause: Raw-material or plant-production problem.

Remedy: None. Save bag sample for manufacturer to inspect.

MIXING—slow solution time

Cause: Insufficient soaking time and/or use of extremely cold water.

Remedy: Allow materials to soak for up to two hours, as necessary, if using cold water.

MIXING—wet mix too thin

Cause: Addition of excessive water during initial mix. Also, insufficient soaking time in cold water.

Remedy: Use recommended amount of water to insure proper consistency. Allow materials to soak up to two hours, if necessary, when using cold water.

APPLICATION—excessive aggregate fallout when spraying

Cause: Excessive air pressure at nozzle or holding gun too close to surface being sprayed.

Remedy: Use proper air pressure for type of material to be sprayed: low for IMPERIAL QT, high for USG Spray Texture. Hold spray gun at proper distance from surface to prevent excessive bounce or fallout of aggregate.

APPLICATION—flotation of aggregate

Cause: Overdilution of job mix and/or lack of adequate mixing after water is added to control consistency.

Remedy: Add proper amount of water as directed on bag to insure proper suspension of materials in mix. Make certain that water is blended into mix.

APPLICATION—poor coverage with spray finishes

Cause: Not enough water to bring texture material to proper spray viscosity and/or improper application such as moving spray gun too slowly, overloading spray surface and using incorrect spray pressures.

Remedy: Add proper amount of water as directed on bag. Use correct spray gun pressures and application technique to insure uniform texture with maximum coverage.

APPLICATION—poor hide

Cause: Overdilution of mix causing reduction in hiding power. Insufficient water in spray finishes causes poor material atomization, resulting in surface show-through. Also caused by overextending material or choosing incorrect spray pressures.

Remedy: See above.

APPLICATION—poor bond or hardness

Cause: Overdilution of job-mix results in thinning out of binder in texture. Contamination or intermixing with other materials can destroy bonding power.

Remedy: Add proper amount of water as stated in bag directions. Always use clean mixing vessel and water. Never intermix with other products.

APPLICATION—stoppage of spray equipment

Cause: Contamination of material or oversize particles can cause clogging of spray nozzle orifices. Also caused by using incorrect nozzle size for aggregate being sprayed.

Remedy: Prevent job contamination during mixing. Use correct nozzle for aggregate size used in texture material.

APPLICATION—unsatisfactory texture pattern

Cause: Improper spray pressures and/or worn spray equipment, either fluid or air nozzle. Also improper spraying consistency and/or spraying technique.

Remedy: Use recommended amount of water to insure proper spraying consistency. Handle spray equipment correctly to achieve best results. Make certain that spray accessories are in good working condition. Replace when necessary.

APPLICATION—unsatisfactory pumping properties

Cause: Mix is too heavy. Worn pump equipment or equipment of insufficient size and power to handle particular type of texture.

Remedy: Use recommended amount of water to insure proper spraying consistency. Make sure that equipment is in good repair and capable of pumping heavy materials.

APPLICATION—texture build-up

Cause: Texturing over a high-suction wallboard joint and/or allowing too much time between roller or brush application and texturing operation. Over-dilution of texture material will produce texture build-up over joint.

Remedy: Seal entire surface with PRO-KYD Alkyd Flat (White) Paint before texture application. Use correct amount of water when mixing texture material and allow safe time-interval between application and final texturing.

APPLICATION—poor color match between ceiling and sidewall

Cause: Overspray on ceiling when walls are sprayed with different texture material that is not matched for color.

Remedy: Use color-matched USG Spray Texture for sidewalls with IMPERIAL QT Texture Finish for ceilings. (Paint added at job to either wall or ceiling texture can cause color difference.)

FINISH SURFACE—poor touch-up

Cause: It is very difficult to touch-up a textured surface to completely blend with the surrounding texture. A conspicuous touch-up is caused either by texture or color variance.

Remedy: Perform touch-up operation with extreme care; otherwise, re-texture entire wall or ceiling area.

FINISH SURFACE—joint show-through

Cause: Overthinned or overextended texturing material does not adequately hide the normal contrast between joint and wallboard paper.

Remedy: Seal entire surface with PRO-KYD Alkyd Flat (White) Paint before texture application. Use correct amount of water when mixing texture material and apply at recommended rate of coverage until joint is hidden.

FINISH SURFACE—white band or flashing over gypsum panels

Cause: High-suction gypsum panel joint caused a texture variation which often appears as a color contrast.

Remedy: Seal entire surface with PRO-KYD Alkyd Flat (White) Paint before spray texture application.

FINISH SURFACE—white band or flashing over concrete

Cause: Damp concrete surface on which leveling compound has dried completely can produce results similar to those of high-suction joint.

Remedy: Allow concrete to age for at least 60 days for complete dryout; then seal with PRO-KYD Alkyd Flat Paint before applying texture.

FINISH SURFACE—joint darkening

Cause: Application over damp joint compound, especially in cold, humid conditions.

Remedy: Allow joint to dry completely before texture application. Seal surface with PRO-KYD Alkyd Flat (White) Paint before texture application and before decorating.

Selector Guide for USG Paint Products

INTERIOR WALLS—GYPSUM PANELS

Type of Finish Desired	Special Surface Treatment New Work	Special Surface Treatment Redecorating	Finish Product Description	Thinners	Method Application	Hours Drying Time Touch	Hours Drying Time Recoat	One Gal. Coverage (Sq. Ft.)
Velvet	SHEETROCK Sealer TEXOLITE Primer-Sealer	SHEETROCK Finish Coat GRAND PRIZE Paint	SHEETROCK Finish Coat GRAND PRIZE Paint	NR/w NR/w	B1, R1, S1 B1, R1, S1	½ ½	24 24	450 450
Flat	SHEETROCK Sealer	Prime if needed	PRO-KYD Alkyd Flat	NR/ms	R1, S1, B1	3	24	400
Semi-Gloss	GRAND-PRIZE Latex Semi-Gloss Enamel	Self-priming	GRAND PRIZE Latex Semi-Gloss Enamel	NR/w	S1, B1, R1	½	24	450
Gloss	TEXOLITE Primer-Sealer	USG Alkyd Enamel Undercoat	DIAMOND Lustre Enamel	NR/ms	S1, B1, R2	3	24	450
Epoxy Glaze	USG Epoxy Enamel or ACREPOX Finish	USG Epoxy Enamel or ACREPOX Finish	USG Epoxy Enamel or ACREPOX Finish	SS/USG	S1, B2, R2	4	24	190-320
Sand Float Texture	None	None	USG Texture I	NR/w	B1, R1	½	24	200
Orange-peel to Ripple Texture	None	None	USG Texture II	NR/w	B1, R1, S1	1	24	200
Heavy Stipple or Period Texture	As required	As required	TEXTONE Texture Paint; then GRAND PRIZE Wall Paint or IMPERIAL QT Finish	W	B, R, O	1	12	9-36/lb.
Medium Light to Medium Heavy Texture	Usually none	None	USG Texture Paint; then GRAND PRIZE Latex Wall Paint (also 2 finishes below) DURACAL Interior Texture	W W	B, R, O S	1 1	12 12	27-54/lb. 50-75

Medium Light to Very Light Text.	Usually none	None	A-B TEX Texture	W	B, R, S, O	1	12	27-54/lb.
			USG Spray Texture	W	B, R, S, O	1	12	20-35/lb.
Sand Finish	None	None	USG Texture XII (Drywall Surfacer)	W	S	1	12	20-35/lb.
			USG Spray Coat, Diamond Texture	W	S	½	3	100-125
INTERIOR METAL (FERROUS) TRIM								
Flat (Water Thinned)	METAL COAT Iron Oxide Primer	None, if free of rust	GRAND PRIZE Latex Wall Paint	NR/w	B1, S1, R2	½	8	450
Gloss (Solvent Thinned)	METAL COAT Iron Oxide Primer	None, if free of rust	METAL COAT Enamel	NR/ms	B1, S1, R2	2	24	600
INTERIOR WOOD TRIM								
Semi-Gloss	USG Alkyd Enamel Undercoat	USG Alkyd Enamel Undercoat	USG Satin-Lustre Enamel	NR/ms	S1, B1, R2	3	24	450-500
Gloss	USG Alkyd Enamel Undercoat	USG Alkyd Enamel Undercoat	DIAMOND Lustre Enamel	NR/ms	S1, B1, R1	3	24	450
Flat	USG Alkyd Enamel Undercoat	None—dull gloss	PRO-KYD Alkyd Flat Paint	NR/ms	R1, S1, B1	1	24	400
Gloss or Satin Finish Clear	USG Sanding Sealer	USG Sanding Sealer	USG Satin Finish Varnish or USG Polyurethane Clear Finish	NR	B only	2	12	500

NOTES: "Drying Time" and "Coverage" estimates are based on average conditions. "Touch"=furniture can be returned to living areas. Abbreviations, Method of Application: B=brush, R=roller, S=spray, O=other: 1,2,3=order of preference. Thinners: NR/w—Not recommended, use water sparingly: NR/ms—Not recommended, use mineral spirits if needed: SS/USG—Special Solvent manufactured by U.S. Gypsum: W—water per directions.

continued on next page

Selector Guide for USG Paint Products—continued

Type of Finish Desired	Special Surface Treatment New Work	Special Surface Treatment Redecorating	Finish Product Description	Thinners	Method Application	Hours Drying Time Touch	Hours Drying Time Recoat	One Gal. Coverage (Sq. Ft.)
INTERIOR CEILINGS—GYPSUM PANELS								
Flat (Med. Scrub)	None, or TEXOLITE Primer-Sealer	None	USG Super Ceiling White	NR/w	B1, R1, S2	½	8	250
Flat (High Scrub)	TEXOLITE Primer-Sealer	GRAND PRIZE Latex Wall Paint	GRAND PRIZE Latex Ceiling White Paint	NR/w	B1, R1, S1	½	8	450
Textured	USG Texture I, II or XII	USG Texture I, II or XII	Any of above finishes for gypsum board	see above	see above	see above	see above	see above
EXTERIOR CEILINGS—GYPSUM PANELS								
Low Lustre			USG Low-Lustre House Paint	NR/ms	B only	2	24	450
Medium Lustre	Dry, clean, apply one coat IMPERIAL House Primer #894, 1 or 2 coats finish paint		USG One-coat Latex House Paint	NR/w	B1, R1, S1	½	8	400
Gloss			IMPERIAL Gloss House Paint	NR/ms	B1, S1, R2	12	48	450

NOTES: "Drying Time" and "Coverage" estimates are based on average conditions. "Touch"=furniture can be returned to living areas. Abbreviations, Method of Application: B=brush, R=roller, S=spray, O=other: 1,2,3=order of preference. Thinners: NR/w—Not recommended, use water sparingly: NR/ms—Not recommended, use mineral spirits if needed: SS/USG—Special Solvent manufactured by U.S. Gypsum: W—water per directions.

Imperial QT
TEXTURE FINISH
XHF
Imperial QT Texture Finish
USG
UNITED STATES GYPSUM

USG
UNITED STATES GYPSUM
USG
Texture Paint
UNITED STATES GYPSUM COMPANY

ONE GALLON U.S. STANDARD
USG
TEXTURE I
Sand Finish Latex Paint
UNITED STATES GYPSUM COMPANY

ONE GALLON U.S. STANDARD
USG
TEXTURE II
Ripple Finish Latex Paint
UNITED STATES GYPSUM COMPANY

USG PAINTS
Satin Lustré
interior
semi-gloss enamel
1 GALLON

USG PAINTS
Grand Prize
interior latex
flat wall paint
1 GALLON

chapter 2

construction standards – general product application

page

GENERAL PROCEDURES 62

Types of Application 62

Planning the Job 63

Horizontal vs. Vertical Application 63

Framing Requirements 64

Estimating 65

GENERAL CONDITIONS 67

Handling and Storage 67

Environmental Conditions 67

GYPSUM PANEL APPLICATION 68

General Recommendations 68

Fastening Methods 69

Screw Application 70

Nail Application 71

Adhesive Nail-On Application 72

Adhesive Application—Multi-Layer 75

Single Layer—Wood Frame 79

Floating Interior Angle 81

Back-Blocking 82

Double Layer—Wood Frame 85

Resilient—Wood Frame 87

Single Layer—Metal Frame 90

Double Layer—Metal Frame 96

Single Layer—Masonry 97

PREDECORATED PANELS 99

TEXTONE Panels 99

TEXTONE Smoothwall 101

TEXTONE Moldings 105

SPECIALTY BOARDS

SHEETROCK W/R Panels 106

page

Radiant Heat Application 109

Gypsum Sheathing 112

USG FIRE FIGHTER Gypsum Board 113

Exterior Ceiling Board 114

ACCESSORIES 117

Corner Bead 117

Metal, Vinyl Trim 117

Control Joints 119

JOINT TREATMENT APPLICATION 120

Application Conditions 120

Mixing Joint Compounds 121

Application Recommendations 124

Hand Tool Application 125

Mechanical Tool Application 128

DURABOND Joint System Application 130

COVER COAT Compound 131

Weather Tips 132

SPECIAL APPLICATIONS 138

Insulating Wool 138

Sound Deadening Board 140

Acoustical Sealant 141

MASTICAL Underlayment 145

Perimeter Isolation 145

Door Frames, Windows 149

Fixture Installation 153

Texture Finishes 158

Curves and Arches 160

Sliding Doors 162

Soffits 163

Resurfacing 166

general application procedure

types of application

Sheetrock SW Gypsum Panels provide a variety of durable, fire-resistant, easily decorated surfacing materials for interior walls, ceilings, and partitions not exposed to extreme or continuous moisture. Sheetrock SW may be applied in one or two layers directly to wood framing members, to metal studs or channels, to gypsum backing boards or to interior masonry walls.

Single-Layer Application—This basic construction is used to suface interior walls and ceilings where economy, fast erection, and fire resistance are required. It is equally suitable for remodeling, altering and resurfacing cracked and defaced areas.

Double-Layer Application—Consists of a face layer of Sheetrock SW applied to a base layer of gypsum, wood fiber or mineral fiber board that is directly attached to framing members. This construction offers greater strength and higher resistance to fire and sound transmission. Walls and ceilings so constructed are highly resistant to cracking and easily decorated. They minimize the possibility of fastener "pops" and discoloration over fastener heads.

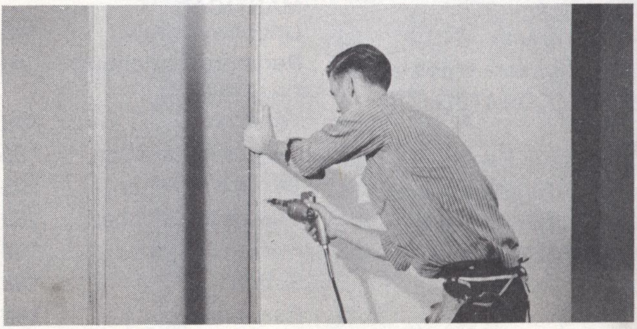
Fastening Methods—Gypsum panels are applied by several alternate methods depending on the type of supports and materials used:

1. **Single Nailing**—conventional attachment for wood framing.

2. **Double Nailing**—for minimizing defects due to loosely nailed panels.

3. **Adhesive Nail-on**—continuous bead of Durabond 200 or 300 Adhesive applied to wood framing plus supplemental nailing; improves bond strength, greatly reduces face nailing needed.

4. **Screw Attachment**—USG Brand Screws are the best known insurance against fastener pops caused by loosely attached panels. Recommended in wood frame application; required with drywall systems employing metal framing (shown below).



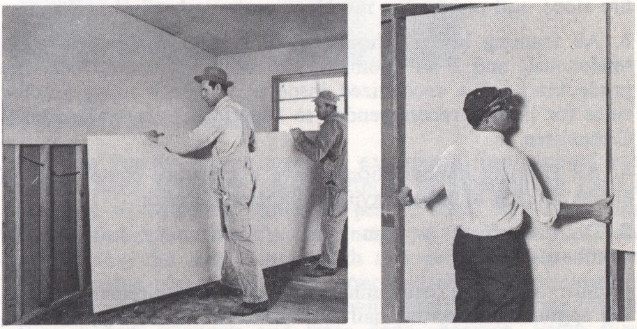
5. **Adhesive Attachment**—the latest advance producing the finest room interiors. Usually requires only supplemental fasteners to attach face layers to gypsum backing boards and interior masonry walls. Reduces nail or screw fastening required, saves spotting and sanding labor; minimizes nail pops and joint ridging.

planning the job

Advance planning by the drywall applicator can mean savings in time and material cost and a better appearing job. Proper planning will result in the most effective use of material, the elimination of unnecessary joints, and the location of required joints in the least conspicuous places. Try to span the whole wall or ceiling from corner to corner with one gypsum panel. Use the longest practical lengths obtainable. This will keep butt joints to a minimum. End joints, when they occur, should be staggered.

In double-layer construction, joints occurring in the face layer are offset at least 10" from parallel joints in the base layer. The layout of the base layer must be planned to account for this offset and still provide optimum joint finishing conditions and efficient use of materials in the face layer as mentioned above.

horizontal vs. vertical application



SHEETROCK SW Gypsum Panels may be applied horizontally (long edges of board at right angles to framing) or vertically (long edges parallel to framing). Fire-rated partitions generally require vertical application; see test report for specific details.

Horizontal application is generally preferable because it offers the following advantages:

1. Reduces lineal footage of joint treatment up to 25%.
2. Strongest dimension of panel runs across framing members.
3. Bridges irregularities in alignment and spacing of framing members.
4. Better bracing continuity—each panel ties more framing members together.
5. Joints on walls are at a convenient height for the finishing operation with a U.S.G. joint system.

For wall application, if ceiling height is 8′2″ or less, horizontal layout of SHEETROCK Panels will result in fewer joints, easier handling, and less cutting. If ceiling height is greater than 8′2″ or wall is 4 ft. wide or less, vertical application will be more practical. For ceiling application, use whichever method will result in fewer joints.

In double-layer construction on ceilings, apply base layer horizontally, at right angles to framing members; apply face layer either vertically or horizontally with joints offset. On walls, apply base layer vertically with edges centered on framing members; apply face layer horizontally. *Exception:* When using predecorated TEXTONE Vinyl Panels for face layer on walls, apply base layer horizontally at right angles to studs.

framing requirements

Wood framing meeting the following minimum requirements is necessary for proper performance of all gypsum panel fasteners:

1. Framework should meet the minimum requirements of FHA, ALSC and local building codes.

2. Framing members should be straight, true and of uniform dimension. Studs and joists must be in true alignment; bridging, fire stops, soil pipes, etc., must not protrude beyond framing.

3. All framing lumber should be of a good grade for the intended use, and 2″x4″ nominal size or larger should bear the grade mark of a recognized inspection agency using grading rules for lumber recommended to American Lumber Standards Committee.

4. All framing lumber should have a moisture content not in excess of 15% at time of gypsum panel application.

5. Do not attach gypsum panels to extremely soft framing members.

Failure to observe these minimum framing requirements, which are applicable to screw, nail and adhesive attachment, will materially increase the possibility of fastener failure due to warping or dimensional changes. This is particularly true if framing lumber has greater than normal tendencies to warp or shrink after erection.

Framing should approach as closely as possible the moisture content it will reach in service by allowing the building, after it is enclosed, to stand as long as possible prior to the application of the gypsum panel. Provide heat in winter or during damp conditions at a uniform temperature in the range of 55° to 70°F. Provide ventilation to remove excess moisture.

Framing should be designed to account for shrinkage in wide dimensional lumber such as floor joists and headers. Gypsum panel surfaces may buckle or crack when firmly anchored across the flat grain of wide wood members as shrinkage occurs. With high exposed walls and cathedral type ceilings, regular or modified balloon framing should be used. With western or platform framing, the panels must either be floated over the wood member or provided with a control joint at the joist location.

Framing Corrections—If joists are out of alignment, 2″x6″ leveling plates attached perpendicular to and across top of ceiling joists may be used. Toe-nailing into joists pulls framing into true horizontal alignment and insures a smooth, level ceiling surface. Bowed or warped studs may be straightened by sawing the hollow sides at the middle of the bow and driving a wedge into the saw kerf until the stud is in line. Reinforcement of the stud is accomplished by securely nailing 1″x4″ wood strips or "scabs" on each side of the cut (see photo).

estimating materials

Gypsum Panels—From practical experience, professional estimators have developed many methods of determining footage required to complete various types of jobs. Basically, these methods stem from the simple principle of "scaling a plan," and determining the length and width and ceiling height of each room on the plan. Frequently, door and window openings are "figured solid" with no openings considered. Exceptions may be large picture windows and large door openings. From these dimensions the estimator determines the square footage of each room. The footage of each room is added to determine total footage required. From these figures the number of gypsum panels needed may be determined.

Plan to use the longest practical length of SHEETROCK SW Gypsum Panels that will span the ceiling and wall area. This will reduce butt joints to a minimum or eliminate them entirely. When estimating walls adjacent to sloping ceilings, plan carefully for minimum waste. Refer to Chapter 1—Product Standards—for available lengths of each type panel.

Screws—For applying single-layer SHEETROCK SW Panels to wood framing, approx. 1,000 1¼″ USG Brand Screws Type W are required for MSF of panel.

Fastener usage for other assemblies varies with the construction and spacing. See system descriptions, Chapter 3.

Nails—Usage for nails is shown in the Selector Guide for Gypsum Panel Nails, Chapter 1.

Caulking—The approx. lin. ft. of caulking bead realized per gal. of USG Acoustical Sealant is: 375 to 400 for ¼″ bead, 180 for ⅜″ bead, 100 for ½″ bead.

Adhesive—The following table shows the amount of adhesive needed per MSF of laminated panel surface:

Product	Approx. Quantity per MSF
DURABOND 200 and 300 Adhesive	3 Gals.
DURABOND 500 Adhesive	5 Gals.
DURABOND 600 Adhesive	3.5 Gals.
PERF-A-TAPE Joint Compound-Taping and DURABOND Joint Compounds	55 to 60 Lbs. (1)

(1) Quantity shown is for sheet lamination. Estimate one-half this amount for strip lamination.

Joint Treatment—For pre-filling "V" grooves formed by abutting, rounded edges of SHEETROCK SW Panels, about 3 lbs. of DURABOND 90 Joint Compound are required per MSF of panel.

For applying all U.S.G. joint systems, approximately 60 lbs. of joint compound and 370 ft. of PERF-A-TAPE reinforcing are required to finish 1,000 sq. ft. of SHEETROCK SW Gypsum Panels.

The following table may be used when determining the quantities of joint treatment products needed for each job:

Estimator for Joint System Products (Tape and Compound Separate)

With This Amount of SHEETROCK SW Gypsum Panels	Use This Amount of Compound	Or—This Amount of Ready-Mixed Compound	And This Amount of Tape
100 sq. ft.	6 lbs.	1 gal.	1—60′ roll
200 sq. ft.	12 lbs.	1 gal.	2—60′ rolls
300 sq. ft.	18 lbs.	2 gals.	2—60′ rolls
400 sq. ft.	24 lbs.	2 gals.	3—60′ rolls
500 sq. ft.	30 lbs.	3 gals.	3—60′ rolls
600 sq. ft.	36 lbs.	3 gals.	1—250′ roll
700 sq. ft.	42 lbs.	4 gals.	1—250′ roll
800 sq. ft.	48 lbs.	4 gals.	1—250′ roll & 1—60′ roll
900 sq. ft.	54 lbs.	1—5-gal. drum	1—250′ roll & 1—60′ roll
1000 sq. ft.	60 lbs.	1—5-gal. drum	1—250′ roll & 2—60′ rolls

general conditions

handling and storage

When drywall construction moved into high-rise buildings, it brought with it the new challenge of moving large gypsum panels from the ground to the point of use, many stories up. Materials handling on the job site can add cost and reduce profit. Time and money savings can be substantial when correct handling procedures are used. Job conditions vary so widely that it is impossible to establish universal materials handling procedures. However, there is much to be learned from inspecting methods used in various job situations and from reviewing resulting costs.

Case studies with photos and step-by-step procedures of material handling methods used by contractors around the country are available. Contact your U.S.G. representative for help in determining on-site handling costs and methods best suited to particular job conditions. Also see Chapter 6—Tools—for descriptions of handling equipment and available suppliers.

If possible, SHEETROCK SW Gypsum Panels should be ordered for delivery a day in advance of drywall application. Materials stored on the job for a long period of time are subject to excessive abuse. Gypsum panels, like millwork, are finish material and must be handled with care to avoid damage.

The SHEETROCK SW Panels should be placed inside under cover and stacked flat on a clean floor in the centers of the largest rooms. It is often desirable to place the necessary number of panels in the location where they will be used. All materials used on the job should remain in their wrappings or containers until ready for actual use.

SHEETROCK SW scheduled for use on ceilings should be placed on top of pile for removal first. Avoid stacking long lengths atop short lengths, as the weight of overhang of the longer panels is apt to break them.

If flat storage space is not available, an alternate method of short-term, on-the-job storage consists of placing the panels vertically against the framing with the long edges of the panels horizontal. This method should not be used for long periods since vertical storage may deform the panels. With this type of storage, some jobs cannot be stocked until electrical and plumbing installations are made.

Caution should be exercised not to overload the framing members acting as braces for this manner of storage, and not to overload floor space in a storage area when panels are piled flat. Outside storage of SHEETROCK SW Panels is not recommended.

environmental conditions

In cold weather (outdoor temperatures less than 55°F.), controlled heat in the range of 55° to 70° F. must be provided. This heat must be maintained both day and night, 24 hours before, during and after entire gypsum panel and joint treatment application and until permanent heating system is in operation or the building is occupied. Ventilation should be provided to eliminate excessive moisture. In glazed buildings, this may be accomplished by keeping windows open approximately 2″ top and bottom (or side-pivoted windows approximately 4″) to provide air circulation. In enclosed areas lacking in natural ventilation, temporary circulators should be used. Under slow drying conditions, allow extra drying time between coats of joint compound. Avoid drafts during hot, dry weather to prevent too rapid drying of compound. Also see "Weather Tips–Joint System Application," later in this chapter.

gypsum panel application

general recommendations

Application—The following recommendations are for SHEETROCK SW Panels applied to wood and metal framing:

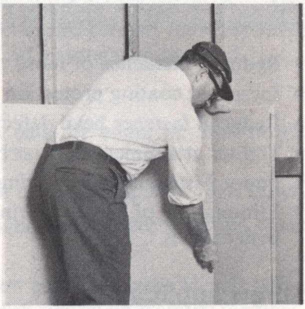
- Install ceiling panels first.
- Cut SHEETROCK SW Panels so they slip easily into place.
- Butt all joints loosely. Never force panels into position.
- Place tapered edges, except at angles, next to one another.
- Never place a butt end next to a tapered edge. (SHEETROCK SW Panels are tapered and wrapped along the long dimensions to facilitate joint treatment. Exposed ends (butts) along the short dimensions are not tapered.) Wherever possible, apply SHEETROCK horizontally and in lengths to span ceilings and walls without end (butt) joints. If butt joints occur, stagger and locate as far from the center of walls and ceilings as possible.
- Support all ends and edges of SHEETROCK SW Panels on framing members, except edges at right angles to framing in horizontal application and face layer of double-layer application and where end joints are to be back-blocked and floated. See description of back-blocking later in this chapter.
- If metal trim is to be installed around edges, doors, or windows, determine if trim is to be installed before panel application. Refer to Chapter 1 for description of products.
- Do not anchor panel surfaces across the flat grain of wide dimensional lumber such as floor joists and headers. Float panels over these members or provide a control joint to handle wood shrinkage. See description of installation later in chapter.

Measuring—All measurements must be accurate. Make two measurements as a check. This procedure will usually warn applicator of partitions or door frames that are out of plumb so that allowances in cutting can be made. A 12-ft. steel tape rule is recommended. All tools for measuring and cutting are illustrated and described in detail in Chapter 6—Tools.

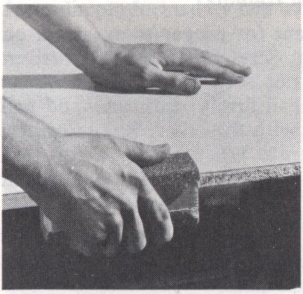
Cutting—Make straight-line cuts across full width or length of panel by scoring face paper, snapping core of panel and then cutting back paper. The common tool used to score and cut gypsum panels is a Stanley drywall trimming knife. Regardless of type used, blade should always be kept sharp so that score will be made through paper into core of gypsum panel.

Use of a straightedge is recommended. An aluminum 4-ft. T-square, ruled on both sides, facilitates clean, straight cuts.

Score paper on face of panel with cutting knife, using a straight edge as a guide.



Break the gypsum core of SHEETROCK *by snapping or bending away from the scored paper side. Complete cutting by running knife through back paper from above or below.*



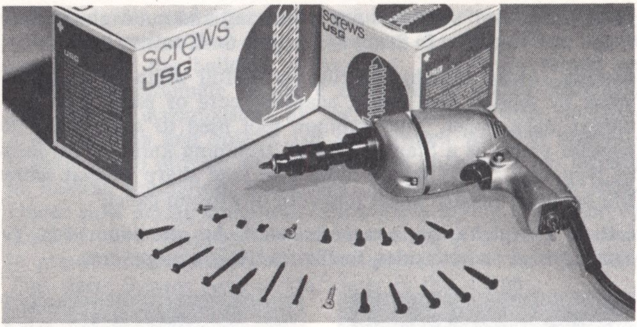
Smooth cut edges with a rasp, coarse sandpaper or metal lath wrapped around a block of wood, or trim with a cutting knife.

fastening methods

Nails have long been the most common fasteners used to attach drywall but they now are rivalled by the USG Brand Screw Type W—the best known insurance against fastener pops caused by loosely attached panels.

Extensive comparison tests have shown the superiority of the screw over the GWB-54 annular ring nail, itself the most effective of nail fasteners. Compared to the nail, the screw offers:

- Over 100% greater withdrawal resistance.
- Over 100% greater "push-off" resistance.



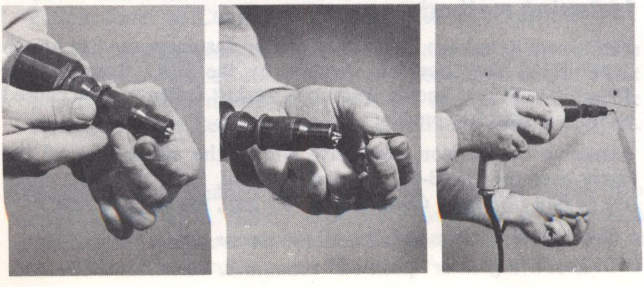
- Reduced incidence of loose panels.
- Increased coating protection against rust.
- Reduced fastener head defects, resulting in fewer callbacks.
- Tighter attachment of Sheetrock SW Panels to framing.
- Fewer fasteners, less spotting and joint compound needed.
- Elimination of paper tearing and core fracturing associated with nailing.

screw application

USG Brand Screws are applied with a positive-clutch electric power tool, commonly called an electric screwdriver, equipped with adjustable screw-depth control head and a Phillips bit. The use of screws provides a positive mechanical attachment of gypsum panels to either wood or metal framing.

Adjust Screwdriver—Set adjustment for proper screw depth on scrap gypsum panel and framing. Screw head must be driven slightly below face of panel, but not deep enough to break the paper. To adjust, grasp control head firmly with one hand and loosen control head lock bushing with the other. Rotate control head to provide proper screw depth. When proper adjustment has been made, secure control head to maintain adjustment (illustrated below).

Place Screw—Magnetic tip holds drywall screw for driving (below, center). Bit tip does not rotate until pressure is applied to gypsum panel during application.



Start Screw Straight—Firm hand grip on electric screwdriver is important for straight line of entry. Screw must enter perpendicular to panel face for proper performance. Drive screws at least ⅜″ from ends or edges of panel to provide a uniform dimple not over 1⁄32″ deep (page 70, right).

Operate electric screwdriver constantly during usage. When screw head is driven solidly against panel, screwdriver head will automatically stop turning and a positive clutch will disengage drive head. Remove screwdriver instantly or the motor will re-engage and chew up screw head or force it below surface of panel. The electric screwdriver technique is relatively simple and a proficiency with the tool can be developed after a few hours' use. For description of USG Brand Screws, see Chapter 1; for screw spacing, see pertinent U.S.G. systems, Chapter 3.

nail application

1. Drive nails at least ⅜″ from ends or edges of SHEETROCK Gypsum Panels.

2. Position nails on adjacent ends or edges opposite each other.

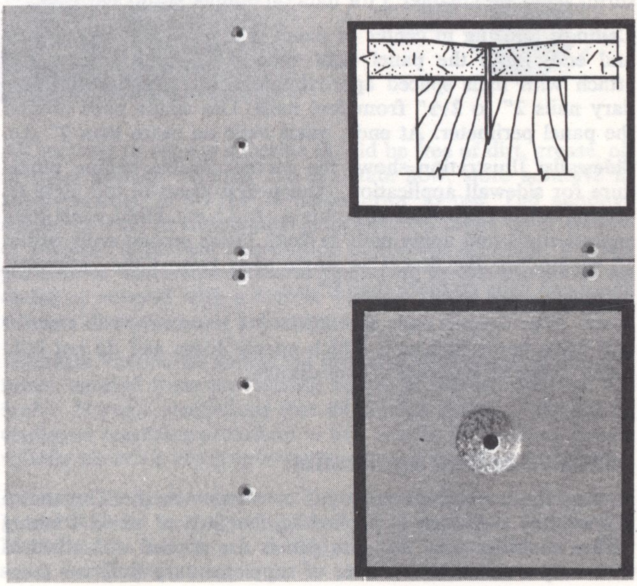
3. Begin nailing from *center* of panel and proceed toward outer ends or edges.

4. When nailing, apply pressure on panel adjacent to nail being driven to insure that panel is secured tightly on framing member.

5. Drive nails with shank perpendicular to face of panel.

6. Use a WAL-BOARD Hammer or crowned-head hammer.

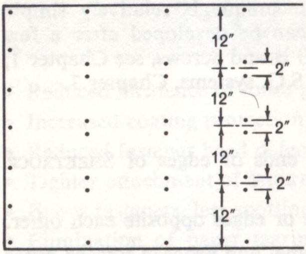
7. With last blow of hammer, seat nail so head is in a slight uniform dimple formed by last blow of hammer.

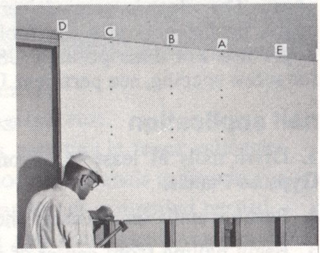


Do not break paper at nail head or around circumference of dimple by over-driving. A nail set should not be used. Depth of dimple should not exceed 1⁄32″.

For nail description, see Chapter 1; for spacing, see pertinent U.S.G. systems, Chapter 3.

double nailing application





In the double nailing method for attaching gypsum panels to wood framing, space the first nails 12″ o.c. along the supports in the field of the panel. Drive second nails about 2″ from the first. Use single nails around the panel perimeter (see drawing).

This application method helps prevent loose panels and resultant nail pops that may occur when panels are not applied correctly and pushed tight against the framing. This method will not reduce the incidence or severity of nail pops due to wood shrinkage. (See Chapter 5 for data on lumber shrinkage.)

Ceilings: Starting in center of panel and working toward edges and ends, hold the panel tight against the ceiling joists and attach with nails spaced approximately 12″ o.c. Drive secondary nails 2″ to 2½″ from first nails. Use single nails around the panel perimeter. At ends, space nails no more than 7″ o.c.

Sidewalls: Illustration shows the correct double nailing procedure for sidewall application. Attach first panel to top plate by driving single edge nails at points A, B, C, etc. Hold panel tight against studs and apply nails in field. Drive second nails within 2″ to 2½″ of the first. Use single nails around the perimeter. Space end nails no more than 8″ o.c.

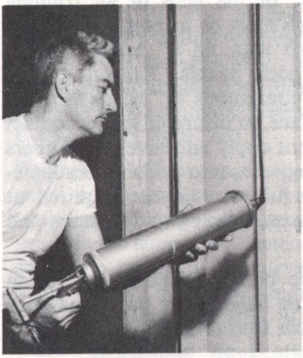
Note: After second nails are applied, it is necessary to restrike and drive home first nails which appear loose and do not hold tight. Check all nails for proper dimple.

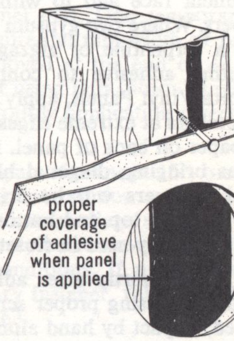
adhesive nail-on application

In the adhesive nail-on method, a continuous bead of DURABOND 200 or 300 Adhesive is applied to the face of wood framing with a cartridge gun. Gypsum panels are applied and attached with only a minimum number of supplementary fasteners compared to conventional fastening methods (see page 75 for fastener spacing required). If using DURABOND Vinyl Foam Tape as supplementary fastener, see U.S.G. folder WB-1263 for application directions. Spacing of framing members is the same as that used for conventional attachment.

Advantages of the adhesive nail-on system using DURABOND 200 or DURABOND 300 are:

- Reduces up to 75% of the number of fasteners used, and consequent problems.
- Stronger than conventional nail application—
  Up to 100% more tensile strength.
  Up to 50% more shear strength.
- Unaffected by moisture, high or low temperature; vermin-resistant.
- Fewer loose panels caused by improper fastening.
- Bridges minor framing irregularities.
- Will not stain or bleed through most finishes.

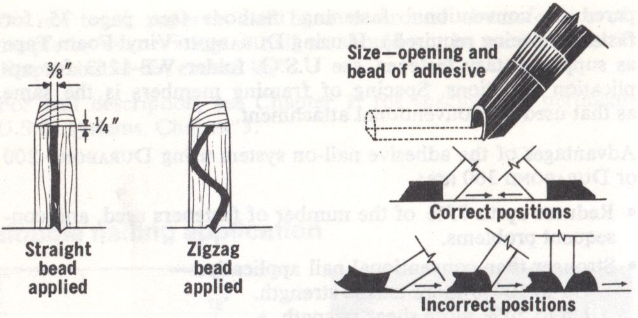




All surfaces to receive adhesive should be free of dirt, grease, oil or other foreign material. To facilitate flow, store adhesive at approximately 70°F. for 24 hours prior to use. The adhesive should be kept in the original unopened container prior to use, or enclosed to prevent evaporation of volatile materials. Unused portions of water-base adhesive remaining in can should be resealed or covered with a film of water to retard evaporation of thinners. Remove water before reusing.

Adequate ventilation should be provided during use to remove fumes emitted from the volatile agents in the solvent-base adhesive. Normal precautions (for flammable material) should be employed regarding proximity to fire, sparks, or smoking before volatile materials are evaporated.

Adhesive is applied with a Drywall Adhesive Applicator—Model A-3 for bulk loading from 5-gal. cans (shown above), Model A-2M for ¼-gal. cartridges. For description of adhesives, see Chapter 1.

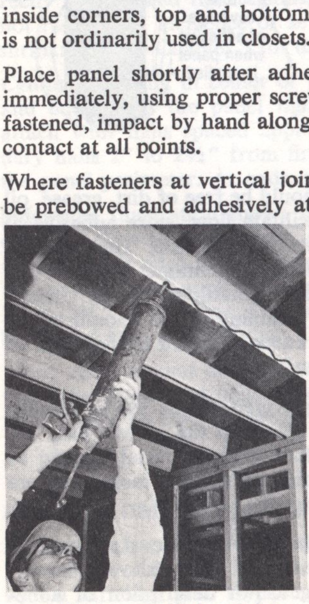


Proper nozzle opening and gun position (see sketch) are required to obtain the right size and shape of bead for satisfactory results. Initial height of bead over framing should be ⅜″ and of sufficient volume to provide 1/16″ thickness of adhesive over the entire support.

Apply adhesive in a continuous ⅜″ bead in the center of the attachment face and to within 6″ of the ends of all framing members. Where two gypsum panels meet on a framing member, apply a serpentine or zigzag bead with an 8″ repeat pattern permitting adhesive to contact both panels. *Exception:* For TEXTONE Vinyl Panels, apply two continuous ⅜″ beads to framing members at extreme edges of face, to insure adequate contact with paper on back of panel. Do not apply adhesive to members such as bridging, diagonal bracing, etc. into which no supplemental fasteners will be driven. Adhesive is not required at inside corners, top and bottom plates, bracing or fire stops and is not ordinarily used in closets.

Place panel shortly after adhesive bead is applied and fasten immediately, using proper screws or nails. After panel has been fastened, impact by hand along each stud or joist to insure good contact at all points.

Where fasteners at vertical joints are objectionable, panels may be prebowed and adhesively attached with fasteners at top and



Adhesive applied to joists.

Nailed only at perimeters.

bottom only. Prebow panels by stacking face up with ends resting on 2x4 lumber or other blocks and with center of panels resting on floor. Allow to remain overnight or until panels have a 2″ permanent bow.

To insure good bond, no more DURABOND 200 Adhesive should be applied than can be covered in 15 minutes; no more DURABOND 300 Adhesive than can be covered in 30 minutes. If adhesive is left exposed to the air for longer periods, the volatile materials will evaporate, causing surface hardness that prevents a full bond.

Remove excess DURABOND 200 Adhesive from the surface of the panels (except predecorated panels), exposed finished surfaces and tools with naphtha, white gasoline or kerosene. Use water to remove excess DURABOND 300 Adhesive.

Allow adhesive to dry at least 48 hours before joint treatment.

fastener spacing—DURABOND 200 or 300 Adhesive

Ceilings—Horizontal Application: Fasten at each framing intersection and 16″ o.c. at each panel end. One temporary field fastener per framing member required at mid-width of panel. If desired, this fastener may be removed at the end of 48 hours, depending on drying conditions. If using DURABOND Vinyl Foam Tape as supplementary fastener, follow application directions in U.S.G. folder WB-1263.

Ceilings—Vertical Application: Space fasteners 16″ o.c. along panel edges and at each framing intersection on ends. Space temporary fasteners 24″ o.c. on intermediate supports. If desired, these temporary fasteners may be removed at the end of 48 hours, depending on drying conditions. If using DURABOND Vinyl Foam Tape as supplementary fastener, follow application directions in U.S.G. folder WB-1263.

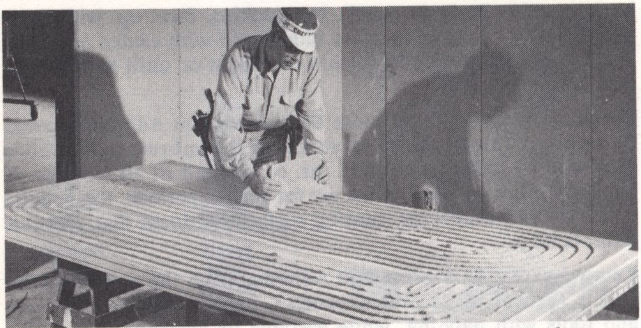
Walls—Horizontal Application: Same as Ceilings—Horizontal Application above, except that no field fasteners are required.

Walls—Vertical Application: Same as Ceilings—Vertical Application above, except that no fasteners are required on intermediate supports. Where fasteners at the vertical joints of the panel are objectionable, prebow the gypsum panel and apply fasteners 16″ o.c. only at the top and bottom of the panel.

adhesive application—multi-layer

In adhesive application, SHEETROCK Gypsum Panels or predecorated TEXTONE Vinyl Panel face layers are job-laminated to a base layer of gypsum panels, sound deadening boards or interior masonry partitions.

Attachment of the face layer to the base layer with PERF-A-TAPE Joint Compound-Taping requires temporary support or supplemental fastening while drying; provides a tight bond, permits leveling and adjustment of boards after contact, and is used generally in fire and sound-rated construction. DURABOND Joint



Spreader used to apply adhesive to back of panel.

Compounds-Taping and 90 provide the above features but require temporary support or supplementary fastening only until compound has set (about 2 hours). Ready-mixed DURABOND 500 and 600 Adhesives also are used for specific applications in laminating (see below).

When base layer is sound deadening board, the face layer of gypsum panels is attached using permanent face layer fasteners top and bottom of panel. Permanent face nailing in field of panel is required for a fire rating. For details on fire ratings, see Chapter 4; for construction data and applicable laminating procedure, see pertinent U.S.G. system, Chapter 3.

Directions for Mixing Powder Joint Compounds (used as a laminating adhesive)—

- Mix joint compound in a clean plastic container, using a sturdy mixing paddle (see Chapter 6—Tools).
- Use clean, drinkable water for mixing; follow quantities shown on bag.
- Pour all water into a container of suitable size, then sift powder into water, stirring continuously.
- Stir mix as follows:

1. For PERF-A-TAPE Joint Compound-Taping mix for approximately 1½ minutes, to make sure all compound is uniformly damp and mixture is smooth. Allow mix to stand for a 30-minute soaking period and stir vigorously for approximately one minute to break down any lumps before use. The consistency of adhesive can be adjusted by adding small amounts of powder or water. Wet mix may be held for up to 24 hours by covering with a small amount of water.

2. For DURABOND Joint Compound-Taping and 90, mix for approximately 3 minutes, making sure compound is uniformly damp. If lumps are present, allow mix to soak for 1 to 2 minutes, then re-mix until smooth and ready to use. Keep compound from being contaminated by other joint compounds, dirty water or previously mixed DURABOND. Contamination will affect hardening time and properties of the compound. Mix only as much compound as can be used within the time period shown on the bag (usually 2 hours for Taping Compound and 1 hour for

DURABOND 90). Compound will harden after this time and cannot be held over even under water. Do not retemper compound.

Sheet Lamination

In this method the adhesive is spread over the entire surface of the gypsum panel. It is suitable for horizontal or vertical application of gypsum panels on walls and ceilings where the entire back surface of the face layer comes into contact with the base layer. Precut and prefit face panels as required. Using an Ames laminating spreader or metal spreader-blade having four ¼"x¼" min. notches, apply PERF-A-TAPE or DURABOND Joint Compound or DURABOND 500 Adhesive in beads ⅜" wide at base by ½" high, and spaced 1½" to 2" o.c. Spread adhesive uniformly over entire back surface of face layer to extreme edges. When using DURABOND Adhesive with an Ames spreader, caution must be observed to prevent hardening of compound in tool. Clean immediately after use. If using DURABOND 600, apply with short-nap roller to both face layer and base layer. Laminate face layer to base layer using moderate pressure and temporary nails, temporary supports, or USG Brand Type G Screws. On walls, fasten at 16" o.c. at top and bottom; on ceilings, attach permanent fasteners at each corner and along edges, 48" o.c. Impact entire area to insure good bond (see below for application details). Wipe off any adhesive forced out at edges. After laminating compound has thoroughly dried (usually 48 hours), remove temporary nails and shoring. Allow Type G screws to remain for later joint treatment.

In horizontal application, face-layer end joints may occur on or between framing members. When end joints occur between framing members, follow back-blocking surface alignment procedure (see detail this chapter), using wood supporting strips to assure alignment.

Three methods for providing face layer support are:

1. Temporary Nailing—Use nails that have at least ¾" penetration into the framing to provide support for the face layer every 16" to 24". A double-headed scaffold nail to which large fiber or wood washers are applied, stucco furring nails, or 6d cooler type nails backed up by gypsum panel blocks (used as washers) may be used.

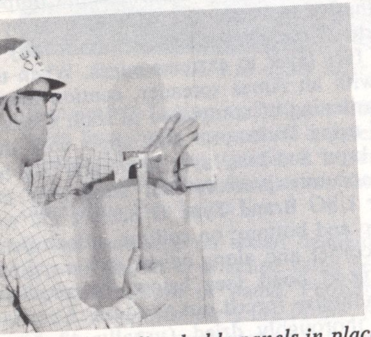
Where nails without gypsum blocks are used, place a thin wood block under claw hammer head when pulling nails to prevent damage to face layer. Properly dimple nail holes before applying joint treatment.

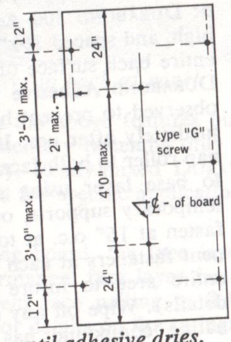
2. Temporary Supports—Provide temporary bracing or shoring that gives support to the face layer at 16" to 24" intervals.

3. USG Brand Screws—Permanently attach face panels with 1½" USG Brand Screws Type G. Using screws assures positive attachment while the adhesive dries and provides flush, level face layer joints often not provided by temporary nailing. The 1½" Type G screw is not intended for use with ⅜" double wall or a combination ½" and ⅜" double-wall construction or with sound deadening board base layers.

adhesive just prior to face panel erection in order not to
ne base layer and reduce holding power of the screw. Press
ayer firmly against base layer with one hand when driving
. Adhesive should be thin enough to flow and level out as
is driven.

screws along vertical edges and in field of panel as fol-
(a) space screws along vertical edges within 2″ of joint, no
er than 12″ from either end and 36″ o.c. max.; (b) space
vs in field along centerline of panel, within 24″ of either
and 48″ o.c. max. (see detail below).

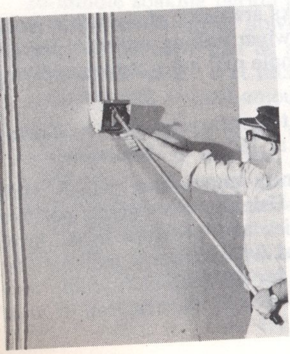




Temporary nailing holds panels in place until adhesive dries.

ip Lamination

this method the adhesive is spread in vertical strips on the
rface of the gypsum face panel or on the wall surface. It is
itable for vertical application of face layer panels on walls,
gnificantly reduces the amount of adhesive used, and simplifies
tachment of the face layer. When used with supplemental
ype G drywall screws, strip lamination provides flush, level
lge joints and positive attachment when the adhesive is drying
at is superior to temporary nailing. This method is recom-
nended when a high degree of sound control is required. It is
ot intended for use on ceilings or for horizontal application of
ace layers.



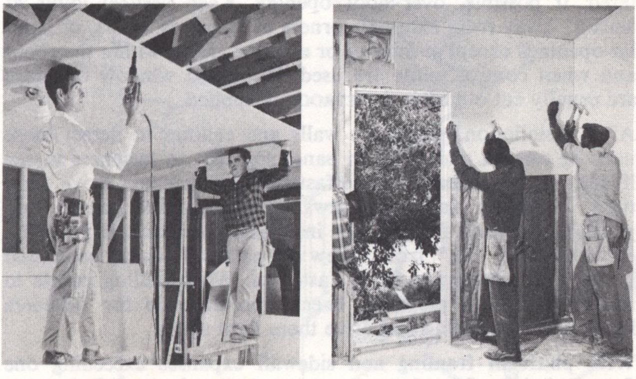
Adhesive for strip lamination can be applied either to base surface or face panel. Procedure reduces amount of adhesive used.

Precut and prefit face panels as required and apply PERF-A-TAPE and DURABOND Joint Compound in vertical strips, 24″ o.c. to base layer or coreboard. Each strip should consist of four beads approximately ⅜″ wide at the base and ½″ high spaced 1½″ to 2″ o.c. The adhesive is applied most easily with a 7″ or 10″ Ames laminating head. Permanently attach face boards to base layer or core units with 1½″ USG Brand Screws Type G located so they penetrate the adhesive strips (see description above for installation of Type G drywall screws).

Apply DURABOND 500 Adhesive in strips to center of gypsum face panel and along both edges of board. Apply strips with a notched metal spreader having four ¼″ x ¼″ min. notches spaced max. of 2″ o.c. Position face panels against base surface; fasten at top and bottom (vertical application) as required. For laminated ceilings, space fasteners 16″ o.c. along edges and ends, with one permanent field fastener per framing member installed at mid-width of panel. Impact entire face panel 16″ o.c., including edges and ends, with rubber mallet to insure bond.

single-layer application—wood frame

This basic construction provides economical, quickly completed load-bearing walls and ceilings wherever fire protection is desired with wood framing—also usable for wall furring. All types of SHEETROCK Gypsum Panels, including predecorated TEXTONE Vinyl Panels, may be used in the assembly. It is suitable for use with framing spaced 16″ o.c. max. for ⅜″ thick panels and 24″ o.c. max. for ½″ and ⅝″ thick panels. The fastening may be any one of several attachment methods (see page 69 for details); however, the USG Brand Screw Type W, designed specifically for this use, virtually eliminates loose attachment of gypsum panels. For measuring and cutting, horizontal or vertical application, and framing requirements, refer to sections found earlier in this chapter. For complete information on fire and sound-resistant assemblies, refer to Chapter 4.



Typical ceiling and wall applications—screw and nail attachment.

installation

Wood Studs and Joists—Apply gypsum panels so that ends and edges occur over framing members, except when joints are at right angles to the framing members as in horizontal application or when the end joints are to be back-blocked (see page 82). To minimize end joints, use panels of maximum practical lengths. When end joints occur, they should be staggered. Arrange joints on opposite sides of a partition so they occur on different studs.

Apply SHEETROCK Gypsum Panels first to the ceiling and then to the walls. If Foil-Back SHEETROCK Gypsum Panels are used, apply foil side against framing. Fit ends and edges closely but do not force panels into place. Cut panels accurately to fit around pipes and electrical fixtures.

Usually two men are required to work on a ceiling. Fasten panels with screws or nails starting from the center of panel and working toward the ends and edges. While fasteners are being driven, the panels should be held in firm contact with the framing or joists. When single fasteners are used, attach panels to framing with screws spaced not to exceed 12″ o.c. or with nails spaced not to exceed 7″ o.c. Drive fasteners at least ⅜″ from edges and ends of panel to provide a uniform dimple not over 1/32″ deep.

Apply gypsum panels to the sidewalls after ceilings are erected. Where horizontal construction is used on walls, apply top wall panel first, butted against ceiling. When vertical application is used, span sidewall from ceiling to floor with a single length of SHEETROCK Gypsum Panel. Use vertical application where ceiling height is over 8′2″ or where this method reduces waste and joint treatment.

On sidewalls, space screws 16″ o.c. max. for framing spaced 16″ o.c., 12″ o.c. max. for framing spaced 24″ o.c. Space nails 8″ o.c. max.

Where openings occur, use SHEETROCK Gypsum Panels of sufficient length to span wall areas, covering the openings. If joints occur near an opening, apply panels so vertical joints are centered, if possible, over door opening. Keep vertical joints at least 8″ away from external corners of windows, doors, or similar openings except at interior or exterior angles within the room and when control joints are used. Door and window openings are usually cut out after SHEETROCK is applied.

After installation, pound on walls and ceilings to detect loose nails or screws, and push on panel adjacent to fasteners to see if there is movement. If loose fasteners are detected, drive them tight. Whenever nails or screws have punctured paper, hold panel tight against framing and install another fastener properly, approximately 1½″ from screw or nailhead which punctured paper and remove the faulty fasteners. When nailing panels to second side of a partition, check opposite side for fasteners loosened by pounding and drive them tight again.

With platform framing and sidewall expanses exceeding one floor in height, float the gypsum panels over second floor joists using RC-1 Sheetrock Resilient Channels (see application described later in this chapter). As an alternate, install a horizontal control joint between gypsum panels at the junction of the bottom of top plates and the first floor studs (see Control Joint Installation described later in this chapter). Do not fasten gypsum panels to the wide face of joists or headers.

Wood Furring—Apply Sheetrock Gypsum Panels to wood furring strips as follows: Furring strips over wood framing must be 2″x2″ (nominal) min. size (may be nom. 1″x4″ if panels are screw-attached). Where Sheetrock is applied parallel to furring strips, securely attached to masonry walls, use furring strips 2″x3″ or 1″x3″ (nominal) min. size; where long edges of Sheetrock are applied across furring, use strips 2″x2″ or 1″x2″ (nominal) min. size. Space furring strips 16″ o.c. Select a fastener length that will not penetrate furring strip.

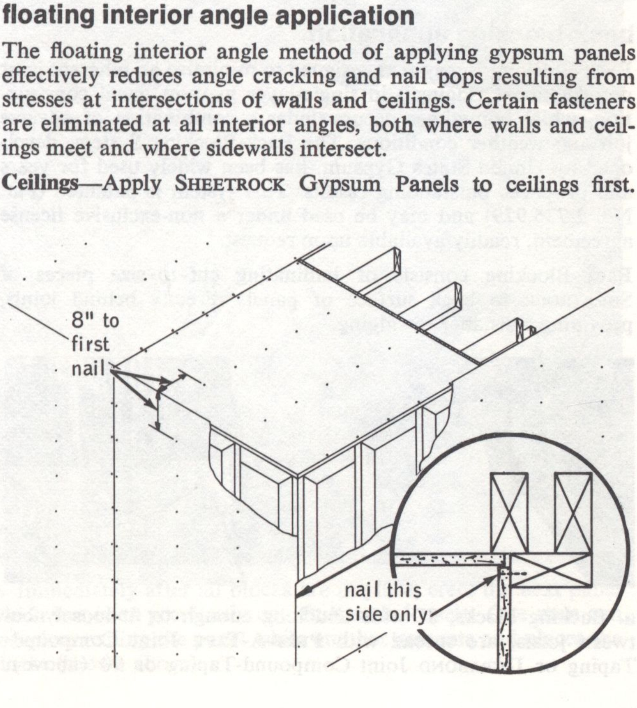
Apply gypsum panels with the long dimension at right angles to furring strips and fasten with 1¼″ Type W screws spaced 12″ o.c. Where there is a possibility of water penetration through the walls, install a layer of asphalt felt between furring strip and wall surface.

Note: Application of Sheetrock over 1″x1″ (nominal) wood furring applied across framing members is not recommended since the relative flexibility of furring prevents proper fastening and tends to loosen nails or screws already driven.

floating interior angle application

The floating interior angle method of applying gypsum panels effectively reduces angle cracking and nail pops resulting from stresses at intersections of walls and ceilings. Certain fasteners are eliminated at all interior angles, both where walls and ceilings meet and where sidewalls intersect.

Ceilings—Apply Sheetrock Gypsum Panels to ceilings first.



Follow standard framing practices for corner fastening. Fit gypsum panels snugly at all angles.

Horizontal Application—Use conventional single nail or screw application where end of panel abuts a wall intersection. Where long edges of panel are parallel to the intersection, apply the first nail or screw nominally 7″ from wall. Use conventional fastening in remainder of ceiling area.

Vertical Application—Use conventional single nail or screw application where long edges of panel abut a wall intersection. Where ends of panel are parallel to an intersection, apply the first nail or screw nominally 7″ from the wall. Use conventional fastening in the remainder of the ceiling area.

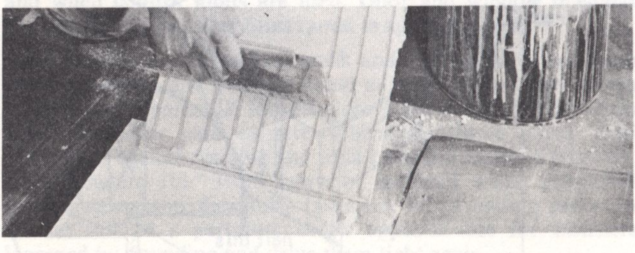
Sidewalls—Apply all gypsum panels to maintain firm contact at the ceiling line and to provide support to ceiling panels previously installed. Along the horizontal angle, apply the first nail or screw nominally 8″ from ceiling intersection. At all vertical angles, omit only the corner fastening of the panel that is first applied and overlapped in the angle. Nail or screw the overlapping panel in conventional manner. Use conventional fastening in remainder of sidewall area.

Double Nailing—When double nailing is used with a floating interior angle, follow above spacing on first nail from intersection and use double nailing in rest of area. Conventional framing and ordinary wood back-up or blocking at vertical internal angles must be provided.

back-blocking application

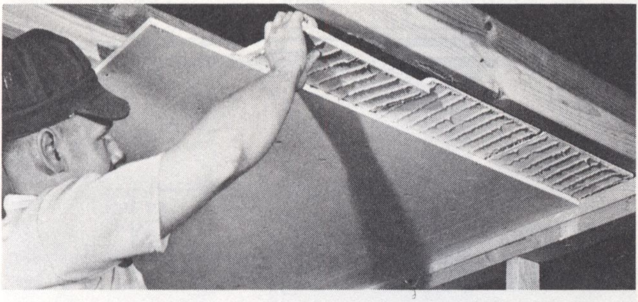
Back-Blocking is a system designed to minimize an inherent joint deformation ("ridging") in single-layer gypsum panel construction, which sometimes occurs under a combination of adverse job and weather conditions. The Back-Blocking System, developed by United States Gypsum, has been widely used for years and produces outstanding results. This system is patented (Pat. No. 2,736,929) and may be used under a non-exclusive license agreement, readily available upon request.

Back-Blocking consists of laminating cut-to-size pieces of SHEETROCK to back surface of panels directly behind joints, providing resistance to ridging.



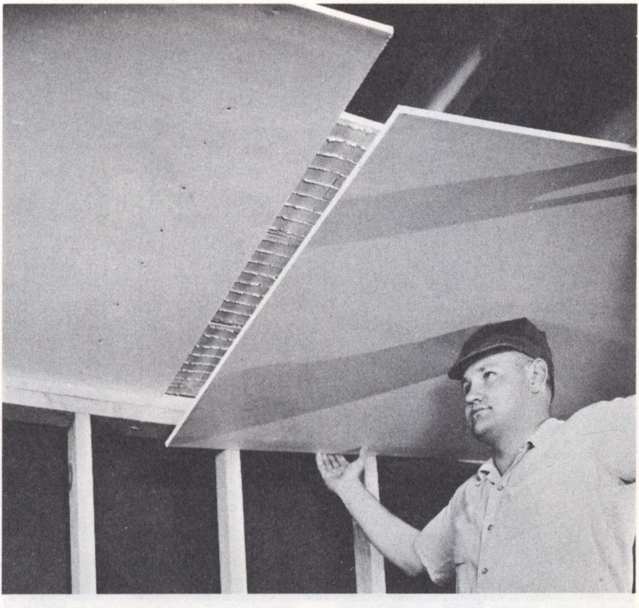
a. Backing blocks, 8″ wide and long enough to fit loosely between joists, are spread with PERF-A-TAPE Joint Compound-Taping or DURABOND Joint Compound-Taping or 90 (above).

Apply adhesive in beads ½″ high, ⅜″ wide at the base spaced 1½″ o.c.

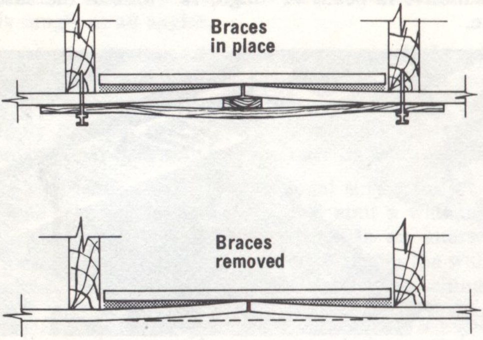


b. Apply gypsum panels horizontally with long edges at right angles to joists. Place backing blocks along full length of edge and ends of panel. Floating of end joints makes it easier to form a good joint over a twisted stud or joist (shown above).

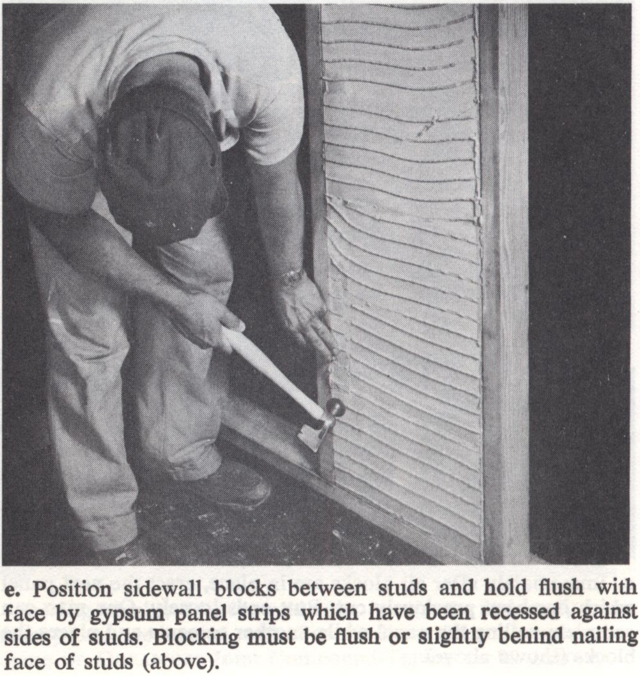
Back-Blocking long edge joints on Sheetrock Gypsum Panels is not required, but floating and back-blocking of all end joints on both sidewalls and ceilings is recommended. End joints on both sidewalls and ceilings may be tapered by the back-blocking method at the discretion of the owner, architect or applicator.



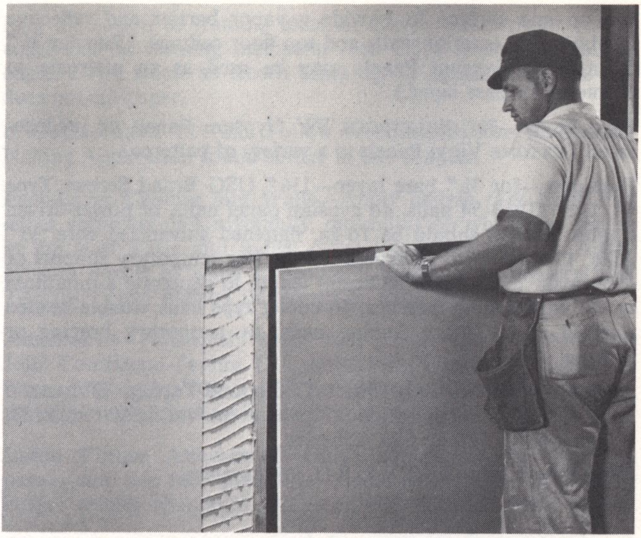
c. Immediately after all blocks are in place, erect the next panel which has been previously cut. Butt ends loosely. One man can complete nailing the panel while another cements and places the blocks (shown above).



d. Cross section shows how floated end joint is tapered and back-blocked. Brace is temporarily nailed over wood strip (top drawing) which depresses ends of panels. When strips are removed, tapered formation remains as shown in bottom drawing.



e. Position sidewall blocks between studs and hold flush with face by gypsum panel strips which have been recessed against sides of studs. Blocking must be flush or slightly behind nailing face of studs (above).



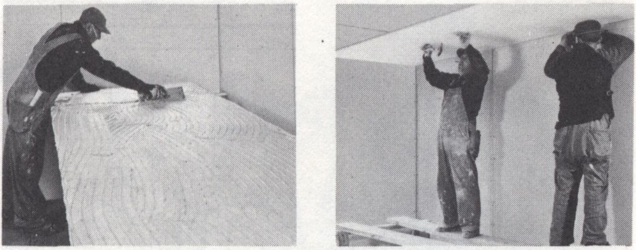
f. After gypsum panel is nailed in place, immediately butt adjacent panel over backing block. Stagger end joints between upper and lower courses of panels (shown above).

double-layer application—wood frame

In this construction a face layer of SHEETROCK Gypsum Panels is job-laminated and/or nailed to base layer of BAXBORD Gypsum Backing Board directly attached to wood framing. Because the construction minimizes the use of mechanical fasteners in the face layer, finer appearance is the result—together with greater strength and higher fire and sound resistance. Generally this construction consists of two layers of ⅜″ gypsum panels, but other thicknesses may be used to achieve additional values.

materials

Base Layer—⅜″ BAXBORD Gypsum Backing Board in 4x8-ft. panels is designed for this double-layer system. BAXBORD is economical, easy to handle, and available plain or with aluminum



Adhesive applied, face panel attached to base layer with screws or nails.

foil on one surface to provide a vapor barrier and reflective insulation on exterior walls and top floor ceilings. (Regular ⅜″ SHEETROCK Gypsum Panels may be used as an alternate to BAXBORD for base layer.)

Face Layer—⅜″ SHEETROCK SW Gypsum Panels or predecorated TEXTONE Vinyl Panels in a variety of patterns.

Fasteners—for ⅜″ base layer—1¼″ USG Brand Screws Type W, 1¼″ GWB-54 nails, 4d gypsum panel nails, or power-driven staples. Staples should be 16-ga. flattened galvanized wire, ½″ wide, 1″ long, with divergent points. For temporary support of face layer, use nails of sufficient length to penetrate a minimum of ¾″ into nailing member, 6d cooler type nails, double-headed scaffold nails, stucco furring nails, or temporary bracing or shoring.

Adhesive—PERF-A-TAPE Joint Compound-Taping, DURABOND Joint Compound-Taping or 90 (where fire rating is required), or DURABOND 500 or 600 Adhesive.

Joint Treatment—Select a U.S.G. joint system.

installation

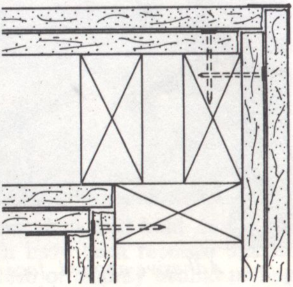
Base-Layer Ceilings—Apply BAXBORD Backing Board horizontally on ceiling first with long edges perpendicular to framing members. End joints may occur on or between framing members and should be offset from face-layer joints by at least 10″. Apply foil-back panels with foil side against framing.

Base-Layer Walls—Apply BAXBORD with long edges parallel to and centered on framing members (vertically). *Exception:* for predecorated face layers, apply base layer horizontally. Apply foil-back panels with foil side against framing.

Attachment—Fasten base-layer gypsum panels with power-driven drywall screws, nails or power-driven staples spaced not to exceed the following:

a. Drywall screws: 16″ o.c. on framing spaced 16″ o.c., 12″ o.c. on framing spaced 24″ o.c.

b. Single nails and staples: 7″ o.c. on ceilings, 8″ o.c. on walls. If staples are used, drive staple with crown at right angles to



Corner detail

long dimension of framing member except where paper bound edges fall on framing members; then drive staples parallel to edges. Drive staple so crown bears tightly against BAXBORD but does not cut paper.

c. Double nails: 12″ o.c. Follow recommendations in Double-Nailing Application found earlier in this chapter.

Face-Layer Ceilings and Walls—Apply ceiling face layer first either vertically or horizontally, depending on whichever results in the least waste and joints; offset joints at least 10″. Apply gypsum panels to walls horizontally except with predecorated TEXTONE Vinyl Panels(illustrated on page 86).

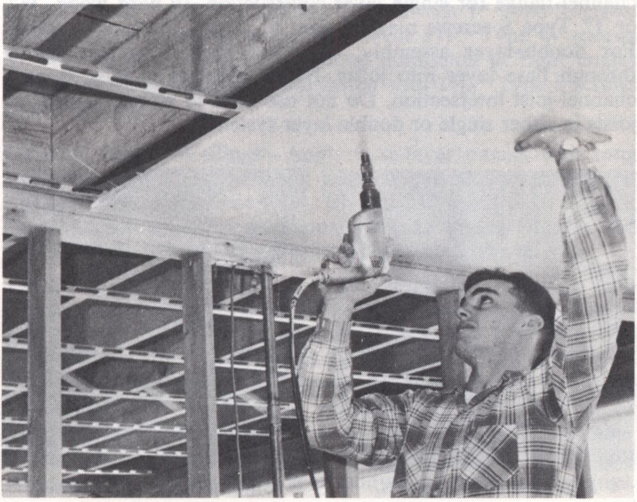
Attachment—Adhesively apply face panels with PERF-A-TAPE Joint Compound-Taping, DURABOND Joint Compound-Taping or 90, or DURABOND 500 or 600 Adhesive (see Adhesive Application directions found earlier in this chapter).

Inside Corner Attachment—Only the overlapping BAXBORD panel—not the face panel—is nailed to framing. A floating corner results when joint is finished with a U.S.G. joint system.

Outside Corner Attachment—Only the BAXBORD Panel–not the face panel–is nailed to the framing. Face panels are held in place when corner is finished with metal corner bead and joint treatment.

resilient application—wood frame

Resilient attachment of gypsum panels (below) with RC-1 SHEETROCK Resilient Channels provides low-cost, highly efficient sound-isolating drywall partitions and floor-ceilings. The metal channels "float" the panels away from the studs and joists; pro-



vide a spring action that isolates the gypsum panel surface. With Thermafiber Sound Control Blankets between studs and joists and Mastical Underlayment Compound over subfloor, resilient application systems provide partitions with 59 STC (Sound Transmission Class) and floor-ceilings with 60 STC and 72 IIC (Impact Insulation Class). Additional features include excellent fire resistance and simple, fast installation for overall economy. For complete information on fire and sound-resistant assemblies, refer to Chapter 4.

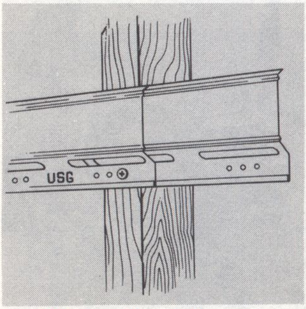
installation

Resilient Channels-Partitions—Attach RC-1 Sheetrock Resilient Channels at right angles (horizontally) to wood studs. Position channel with nailing flange down. Use 1¼″ USG Brand Screws Type W or 6d cement coated cooler nails driven through pre-punched holes in channel flange. With extremely hard lumber for studs, ⅞″ or 1″ Type S screws may be used (see photos below). Fasten channel to stud at each intersection.

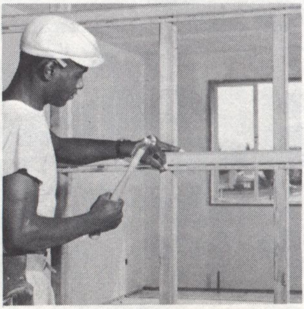
Locate channels 24″ up from floor, within 6″ of the ceiling line and no more than 24″ o.c. Extend channels into all corners and fasten to corner framing. At floor beneath channels, attach ½″x3″ wide continuous gypsum panel filler strips to bottom plate. Splice channel directly over studs by nesting—not butting—the channels and fastening both flanges to the support.

Where cabinets are to be installed, attach RC-1 Channels to studs at center of top and bottom cabinet hanger brackets. When distance between hangers exceeds 24″ o.c., install additional channel at midpoint between hangers.

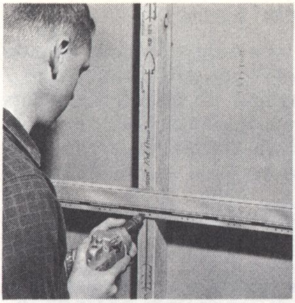
Resilient Channels-Ceilings—Attach RC-1 Sheetrock Resilient Channels at right angles to wood joists. Use 1¼″ Type W or Type S screws driven through the pre-punched holes in the channel flange for single layer construction. In hard wood, ⅞″ or 1″ Type S screws may be used to attach channels to joists. For double-layer assembly, use 1⅞″ Type S screws driven through base layer into joists. Fasten channel to joist at each channel-joist intersection. Do not use nails to attach channel to joists in either single or double-layer system.



RC-1 resilient channel.



Channel spacing on studs.



Channel attachment to stud.

Board attachment to channel.

Locate channels within 6″ of the wall-ceiling intersection and no more than 24″ o.c. for joists spaced 16″ o.c. or 16″ o.c. for joists spaced 24″ o.c. Extend channels into all corners and fasten to corner framing. Do not cantilever channels more than 6″. Splice channel directly under joists by nesting the channels and screwing through both flanges to the support.

Gypsum Panels—Partitions—Apply gypsum panels horizontally with long dimension parallel to resilient channels. Attach panels with 1″ USG Brand Screws Type S spaced 12″ o.c. along channels. Center horizontal abutting edges of panels over screw flange of channel, and screw-fasten each edge. Where channel resiliency makes screw placement difficult, use the next longer screw. For fire-rated construction, float vertical butt joints between studs and back joint with a length of RC-1 channel. Where fire rating is not required, board may be applied with long dimension vertical.

For two-layer application of gypsum panels, apply base layer vertically and attach to resilient channels with 1″ Type S screws spaced 24″ o.c. and to wood studs with 1¼″ Type W screws 12″ o.c. Apply face layer with long dimension at right angles to long edges of base layer and fasten with 1⁵⁄₁₆″ Type S screws spaced 16″ o.c.

Gypsum Panels—Ceilings—Apply base-layer panels with long edge across joists and with end joints staggered. Fasten with 6d cement coated nails spaced 1″, 6″ and 21″ from each edge in field of panel and with additional nails 15″ from edge at end joints. Then apply resilient channel as described above.

Apply face layer panels of maximum practical length with long dimension at right angles to resilient channels, with end joints staggered and neatly fitted. Attach panels with Type S screws spaced 12″ o.c. in field of panels and along abutting ends. Use 1″ screw length for ½″ thick panels; 1⅛″ length for ⅝″ thick panels. Center end over web surface of resilient channel or center midway between channels and backblock. Use a minimum 21″ cut length of resilient channel for backing behind butt joints. Properly support panels around all cut-outs and openings.

single-layer application—metal frame

This fire-resistant construction has won wide acceptance because of its low cost, speed of erection and light weight—only 5 to 7 psf. Partitions are non-load bearing and are ideal for corridors and space-saving dividers within units. Ceilings, both suspended and furred, conceal overhead structural and mechanical elements and provide a surface ready for either final decoration or adhesively applied acoustical tile.

installation

Partition Layout—Properly position partition location according to the partition layout. Snap chalk lines at ceiling and floor. Be certain partition will be plumb.

Runner Installation—Securely attach runners:

1. To concrete slabs—using stub nails, shielded screws, or power-driven fasteners (see photo below).

2. To metal concrete inserts—using ⅜″ Type S-12 pan head screws.

3. To gypsum or concrete block walls—using square-cut nails or power-driven fasteners.

4. To suspend ceilings–using expandable molly type fasteners or toggle bolts.

5. To wood framing—using 12d nails or suitable screws. Secure runners with fasteners located 2″ from each end and spaced not to exceed 24″ o.c. Secure runner ends at door frames with two anchors when 3-piece door frames are used. *Exception:* Fasteners securing runners to suspended ceilings should be spaced not to exceed 16″ o.c.

At partition corners, extend one runner to the end of the corner and butt the other runner to it allowing clearance for gypsum panel thickness as necessary. Runners should not be mitered.

Runner attachment with power-driven fastener.

Stud Erection—Insert floor-to-ceiling height USG Metal Studs between runners, twisting them into position. Space studs 24″ o.c.

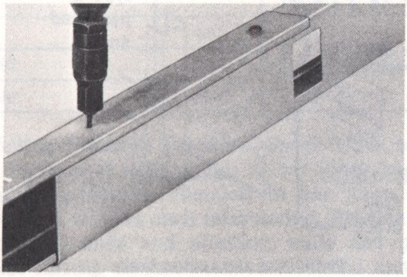
At partition corners, install a stud so that it forms the outside corner. Follow application of base-layer gypsum panel to this

stud, install second stud in the abutting run and screw-attach web through base layer to flange of first stud (illustrated above).

Place studs in direct contact with all abutting partitions, partition corners and other construction. Where there is a possibility of water penetration through the exterior walls, install an asphalt felt protection strip between stud and wall.

Install rough framing around door and borrowed light frames as described later in this chapter. Anchor all studs adjacent to door and borrowed light frames, partition intersections and corners to the floor and ceiling runners. Use the USG Metal Lock Fastener or positive screw attachment with 3⁄8″ Type S pan head or hex washer head drywall screw through each stud and runner flange.

USG Metal Studs may be conveniently spliced together when required. To splice two studs, nest one into the other to a depth of at least 8″. One flange of each stud must be in between two flanges of mating stud so studs interlock. Fasten together (below)



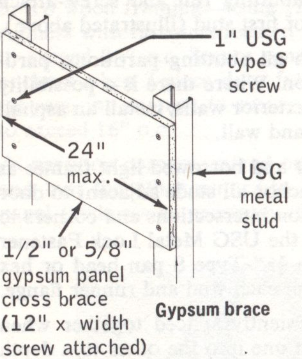
with two ⅜″ Type S pan head screws in each flange. Locate each screw no more than 1″ from ends of splice.

Chase Wall Framing Erection—Align two parallel rows of floor and ceiling runners according to the partition layout. Spacing between outside flanges of each pair of runners must not exceed 24″. Follow instructions above for attaching runners.

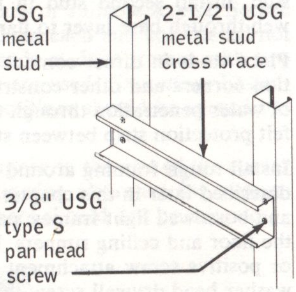
Position metal studs vertically in runners, 24″ o.c. with flanges in the same direction, and with studs on opposite sides of chase directly across from each other. Anchor all studs to floor and ceiling runner flanges with USG Metal Lock Fastener or ⅜″ Type S pan head or hex washer head screws.

Cut cross bracing to be placed between rows of studs from gypsum panels 12″ high by chase wall width. Space braces 48″ o.c. vertically and attach to stud web with six 1″ Type S screws per brace. If larger braces are used, space screws 8″ o.c. max. on each side.

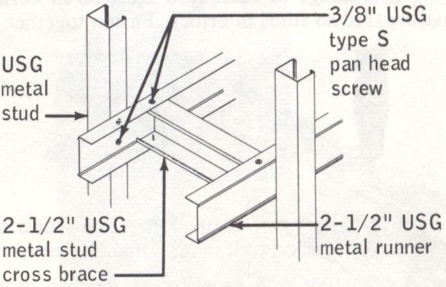
Bracing of 2½″ metal studs may be used in place of gypsum panels. Anchor web at each end of metal brace to stud web with two ⅜″ pan head screws. When chase wall studs are not opposite, install metal stud cross braces 24″ o.c. horizontally and securely anchor each end to a continuous horizontal 2½″ runner screw-attached to chase wall studs within the cavity.


1" USG type S screw
24" max.
USG metal stud
1/2" or 5/8" gypsum panel cross brace (12" x width screw attached)

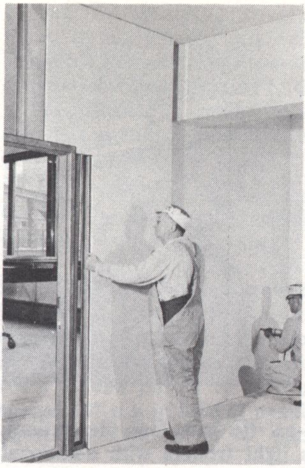
Gypsum brace

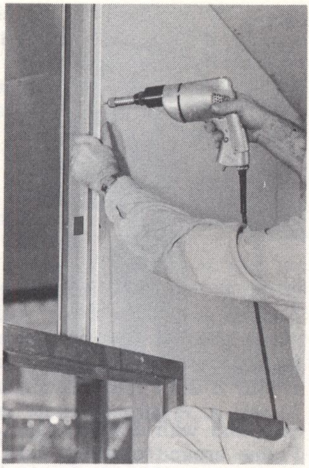

USG metal stud
2-1/2" USG metal stud cross brace
3/8" USG type S pan head screw

Metal stud brace


3/8" USG type S pan head screw
USG metal stud
2-1/2" USG metal stud cross brace
2-1/2" USG metal runner

Metal stud and runner brace





Gypsum Panel Erection—Apply gypsum panels with long dimension parallel (or at right angles) to studs. Use maximum practical lengths to minimize end joints. Position panel so all abutting ends and edges (except edges with horizontal application) will be located in center of stud flanges. Be certain joints are neatly fitted and staggered on opposite sides of the partition so they occur on different studs. Cut panels to fit neatly around all outlets and switch boxes.

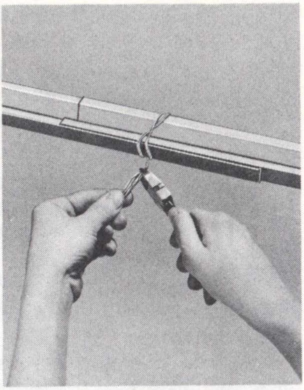
For vertical single-layer application fasten panels with 1″ USG Brand Screws Type S spaced a maximum of 12″ o.c. in field of panel and 8″ o.c. along vertical abutting edges. Stagger screws on abutting edges or ends.

For horizontal single-layer application, fasten panels with 1″ USG Brand Screws Type S spaced a maximum of 12″ o.c. in field of panel and 12″ o.c. along abutting end joints.

For fire-rated construction, apply gypsum panels and fasten with 1″ USG Brand Screws Type S as shown in table below:

Test Number	Panel Appln.	Fastener Spacing and Location
T-3362 OSU	vert.	12″ o.c. to studs at joints and runners, 8″ o.c. to studs in field
T-1174 OSU	vert.	8″ o.c. to studs at joints, 12″ o.c. to studs in field
U of C 7/31/62	vert.	
GA-WP-45 1-hr.	horiz.	

Furred Ceiling Framing Erection—Space USG Metal Furring Channels 24″ o.c. at right angles to bar joists (spaced 48″ o.c. max.). Saddle-tie furring channels to bar joists with double-strand 16-ga. tie wire at each intersection. Provide 1″ clearance between furring ends and abutting walls and partitions. At splices, nest furring channels at least 8″ and securely wire-tie



each end with double-strand 16-ga. tie wire (see illustration). Frame around openings such as light troffers with additional furring channels and wire-tie to bar joists.

For bar joist spacing greater than 48″ and up to 60″, use 1⅝″ USG Metal Studs as furring channels; for spacing greater than 60″ and up to 84″, use 2½″ studs; and for support spacing greater than 84″ and up to 120″, use 3⅝″ studs. Wire-tie to bar joists as above. Position 1⅝″ studs with open side up; position the larger studs with opening to side (on edge).

Component Spacing and Span

Member	Max. Spacing o.c.	Max. Span
USG Metal Furring Channel	24″ (1)	48″
USG Metal Stud 1⅝″	24″ (1)	60″
2½″	24″ (1)	84″
3⅝″	24″ (1)	120″
1½″ Cold-Rolled Channel	48″	48″
Hanger Wire	48″	—

(1) Suitable for ½″ and ⅝″ thick gypsum panels.

Suspended Ceiling Grillage Erection—Space 8-ga. hanger wires 48″ o.c. along carrying channels and within 6″ of ends of carrying-channel runs. In concrete, anchor hangers by attachment to reinforcing steel, by loops embedded at least 2″ or by approved inserts. For steel construction, wrap hanger around or through beams or joists.

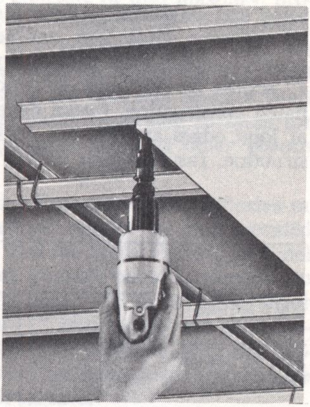
Install 1½″ carrying channels 48″ o.c. (24″ for fire-rated construction) and within 6″ of walls. Position channels for proper ceiling height, level, and secure with hanger wire saddle-tied along channels (see illustration above). Provide 1″ clearance between runners and abutting walls and partitions. At channel splices, interlock flanges, overlap ends 12″ and secure each end with double-strand 16-ga. tie wire.

Erect metal furring channels at right angles to 1½″ carrying channels. Space furring 24″ o.c. and within 6″ of walls. Provide

1″ clearance between furring ends and abutting walls and partitions. Attach furring channels to 1½″ channels with Metal Furring Channel Clips installed on alternate sides of carrying channel. Saddle-tie furring to channels with double-strand 16-ga. tie wire when clips cannot be alternated. At splices, nest furring channels at least 8″ and securely wire-tie each end with double-strand 16-ga. tie wire.

At light troffers or any openings that interrupt the carrying or furring channels, install additional cross reinforcing to restore the lateral stability of grillage.

Panel Erection—Apply gypsum panels of maximum practical length with long dimension at right angles to furring channel (see below). Center end joints over channel web; fit joints neatly and accurately; stagger end joints from those in adjacent panel rows. Fasten panels to furring channels with Type S screws spaced 12″ o.c. in field of panel and along abutting ends. Use 1″ screw length for ½″ or ⅝″ thick panels.



Back-Blocking Technique—When a fire-rated method of back-blocking is desired, float gypsum panel end joints between furring channels. Place a 5-ft. length of Metal Furring Channel over and parallel to each end joint where one of the end joint-panels is installed (see above). Six inches of channel must rest on each gypsum panel adjacent to end joint-panels. While holding end joint-panel and furring channel firmly together, fasten them with Type S screws at 12″ intervals. Install mating end joint-panel and fasten to 5-ft. furring channel in same way. It is not necessary to wire-tie furring channel to carrying channels.

End joints may be aligned in some fire-rated assemblies if desired for installation of control joints. Where end joints are aligned, support each abutting end of panel with a continuous furring channel wire-tied to joists and spaced 2″ from end of panels. Protect joint from above with 2″ wide gypsum panel strips laid over joints.

double-layer application—metal frame

Double-layer construction using metal studs offers some of drywall's best performances in both fire and sound resistance (see Chapter 4 for specific details). These economical, lightweight partitions are adaptable as party walls or corridor walls in virtually every type of new construction.

In these non-load bearing assemblies a face layer of SHEETROCK SW Gypsum Panels is job-laminated and/or screw-attached to a base layer gypsum panel applied to metal studs. The installation of USG Metal Studs and Runners is the same as for Single-Layer Application described earlier in this chapter.

installation

Base-Layer Erection—Apply gypsum panels with long dimension parallel to studs. Position panel so abutting edges will be located in center of stud flanges. Be certain joints are neatly fitted and staggered on opposite sides of partition so they occur on different studs. For double-layer screw attachment, fasten panels to studs with Type S drywall screws spaced 16″ o.c. Use 1″ screws for ½″ and ⅝″ thick panels. For double-layer laminated construction, fasten panels with 1″ screws spaced 8″ o.c. at joint edges and 12″ o.c. in field of panel. For fire-rated construction, fasten panels with 1″ screws spaced as shown below:

Test Number	Fastener Spacing and Location
U of C 6/15/65	12″ o.c. to studs at joints and in field, 12″ o.c. to runners
2-hr. UL Des U411 (was 11-2 hr.)	For adhesively laminated face panel—8″ o.c. to studs at joints, 12″ o.c. to studs in field
2-hr. UL Des U411 (was 11-2 hr.)	For screw-attached face panel—16″ o.c. to studs at joints and in field
2-hr. UL Des U412 (was 28-2 hr.) U of C 9/21/64	12″ o.c. to studs at joints and in field

Face-Layer Erection—Apply gypsum panels with long dimension parallel to studs. Position panel so abutting edges will be located in center of stud flanges. Stagger joints from those in base layer and on opposite sides of partition. Four double-layer screw attachment, fasten panels to studs with Type S drywall screws spaced 16″ o.c. Use 1$\frac{5}{16}$″ screws for ½″ thick panels and 1⅝″ screws for ⅝″ thick panels. For double-layer laminated construction, attach face layer using adhesive lamination described earlier in this chapter. For fire-rated construction, fasten gypsum panels with screws as shown in table next page:

Test Number	USG Brand Screw		Fastener Spacing and Location
	Length	Type	
U of C 6/15/65	1⅝″	S	12″ o.c. to studs at joints and in field, 12″ o.c. to runners
2-hr. UL Des U411 (was 11-2 hr.)	1½″	G	Adhesive lamination and supplementary screws
2 hr. UL Des U411 (was 11-2 hr.)	1⅝″	S	16″ o.c. to studs at joints and in field, 12″ o.c. to runners
2-hr. UL Des U412 (was 28-2 hr.)	1½″	G	Adhesive strip lamination and supplementary screws
2-hr. UL Des U412 (was 28-2 hr.) U of C 9/21/64	1⅝″	S	12″ o.c. to studs at joints and in field

single-layer direct application—masonry

Sheetrock SW Gypsum Panels adhesively applied directly to interior, above-grade, monolithic concrete or unit masonry, provide durable incombustible drywall surfaces for these walls. Where Sheetrock is laminated to Pyrobar Partition Tile, this non-load bearing assembly offers excellent fire protection, light weight, low cost, and is highly suited for vent and elevator shaft enclosures. Also provides smooth, easily decorated surfaces for interior concrete block, brick, unglazed tile and other porous unit masonry.

Gypsum panels are laminated using Durabond 500 Adhesive or Durabond Joint Compounds; either regular or predecorated Textone Panels may be applied. Use the Metal Furring Channel System described in Chapter 3 for gypsum panel application to exterior and below-grade wall surfaces. The inside of exterior cavity walls having a continuous (1″ min.) clear air space between exterior masonry and masonry or concrete, with *the outside surfaces of the interior masonry well dampproofed,* may be considered here as an interior wall surface.

installation

Preparation—Mortar joints on surface of unit masonry to which gypsum panels are to be bonded should be cut flush with the masonry to provide an even surface. The wall surface should be plumb and true to dimensions. Grind off rough or protruding areas before laminating is started. Fill pockets or holes greater than 4″ in diameter and ⅛″ deep with grout, mortar, or joint compound and allow to dry before laminating.

The masonry surface must have all form oils, grease and other release agents removed. It must be dry and free of dust, loose particles and efflorescence. Apply cold-water wall size to seal the surface of Pyrobar Tile.

If a wood base is used, attach a wood nailer to the wall with mechanical fasteners before laminating gypsum panels. Nailer should be equal to the panel thickness and at least 1½" high (or ¾" less than wood base height).

Panel erection with DURABOND 500 Adhesive—Cut floor-to-ceiling-height panels for vertical application. Allow for a continuous clearance (⅛" to ¼") at the floor. Spread DURABOND 500 Adhesive uniformly at center and near the edges of each panel. Each strip of adhesive consists of four beads, ¼"x¼" min. and spaced 2" o.c. Strips can be applied with an Ames laminating spreader or a metal spreader having ¼"x¼" notches, spaced as required. Position panels vertically over the wall surface and press into place. Use a rubber mallet to impact over the entire surface 16" o.c., including edges and ends, to insure adequate bond.

Finishing—Install metal trim at all wall and ceiling intersections with other types of masonry. Apply metal trim and corner bead and treat all joints, temporary nail holes, fastener heads and trim as directed in this chapter. Apply reinforcing tape along the full length of joint.

Panel erection with DURABOND Joint Compound (used as adhesive)—Plan panel layout for vertical application. Measure and cut to required length sufficient to cover entire wall.

Using a clean, smooth-sided container or drum, mix DURABOND Compound with an equal volume of clean sand conforming to ASTM C35. Batch should be large enough to laminate all of the prepared panels, providing batch size does not exceed 25 lbs. of combined DURABOND and sand. Place water, ½ pt. per lb. of DURABOND Compound, into container first. With mixer turning slowly, add DURABOND and sand. Mix 1 to 2 min., or until lumps are dispersed, with heavy-duty drill and cage-type paddle.

Spot-apply adhesive over entire panel. Spots should be 2" to 3" across, ½" to ¾" high, and about 12" apart in staggered rows. Spots should be kept 1" away from perimeter of panel.

Place panel vertically against masonry. Press firmly in place to level panel and insure good bond. Shift panel vertically or horizontally to align. When placed, aligned and shimmed at floor line, anchor temporarily with wood cleats at ceiling and floor. Hold abutting panels in alignment at third points (quarter points for ceiling heights over 8-ft.) with masonry nails driven through the panel, or cleats, and into the masonry. Exercise caution when driving all temporary nails to avoid moving panels, which impairs adhesive bond.

Cleats should remain undisturbed overnight. Allow at least 24 hours before attaching trim, control joints, base, etc., or before treating joints.

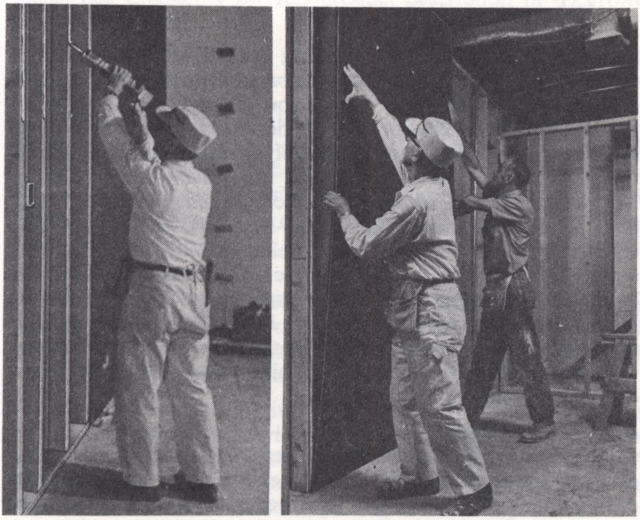
predecorated panel application

The use of predecorated gypsum panels takes full advantage of the real economy of fire-resistant gypsum panels in providing highly serviceable, quickly installed, decorative walls. With vinyl-surfaced TEXTONE Gypsum Panels, walls have long-lasting resistance to stains and scuffs, are readily washable and colorfast. These easily applied panels resist dimensional change caused by moisture, will not harmfully warp, crack or splinter. A variety of patterns in attractive decorator colors are available for commercial or residential construction (see Chapter 1 for full product description).

TEXTONE Gypsum Panels are usually applied vertically to the walls so ends occur at floor and ceiling lines. The beveled or square edges form an attractive joint not requiring joint treatment. Panels may be applied horizontally to wainscot height but are not practical as a ceiling finish, as end joints are difficult to conceal. Adaptable for use with wood or metal studs in single or double-layer application in new construction or over plaster or gypsum panel surfaces in remodeling. May also be applied to wood furring strips attached to masonry.

installation

When installing textile and woodgrain patterns, place panels against wall, inverting alternate panels, and rearrange to obtain the best match in pattern and tone; there will be a slight variation from panel to panel. Number backs of panels for proper installation sequence.



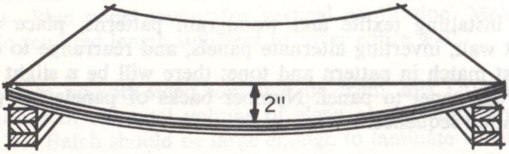
Workmen apply adhesive to studs, then follow closely with erection of prefinished TEXTONE Panels.

Apply panels vertically. Position less-than-full-width panels with cut edge at corner. Use USG Color-Matched Nails wherever nails are exposed. Drive nails with plastic-headed hammer, rawhide mallet, or carpenter's hammer with pliable leather over head. Space 1⅜″ nails at least ⅜″ from ends and edges, 8″ o.c.

Cut TEXTONE Panels with a sharp trim knife. For straight cuts, cut through vinyl film into core using a straightedge. Snap board and cut backing paper. For irregular cuts, cut vinyl with knife and cut core with keyhole saw. *Caution:* Holes made with special outlet cutters should be cut from the backside of panel to avoid delamination of vinyl around the cut.

TEXTONE Moldings in matching colors and patterns are available to finish edges and conceal fasteners in TEXTONE Gypsum Panel installations. Refer to Chapter 1 for product description.

Prebowing—Where fasteners at the vertical joints are objectionable, panels may be prebowed, adhesively applied and fastened at top and bottom only. Prebow by stacking panels face up with ends resting on 2x4 lumber on edge or gypsum panel slutters and center of panel resting on floor. Allow to remain overnight or until panels show at least a 2″ permanent bow. During high humidity, it may be necessary to elevate ends as much as 8″ to achieve desired permanent bow.



Suitable Adhesives—The following special adhesives may be used for TEXTONE Panels: solvent-based DURABOND 200 Adhesive—for TEXTONE Panel application to metal framing; water-based DURABOND 200 or 300 Adhesive—for TEXTONE Panel application to wood framing or polystyrene rigid-foam insulation; water-based DURABOND 500 Adhesive—for laminating TEXTONE Panels to monolithic concrete, concrete block, wood fiber sound deadening board, INSO-BAK rigid insulation, polystyrene or urethane rigid-foam insulation and most other wall surfaces in non-fire rated construction; DURABOND 600—for laminating TEXTONE Panels to gypsum board. Any DURABOND Joint Compound or PERF-A-TAPE Joint Compound-Taping is required for laminating TEXTONE Panels in a fire-rated construction. Other adhesives should be avoided since they may not be compatible with the vinyl surface.

Adhesive Application to Framing—Use prebowed panels and apply adhesive in continuous ⅜″ beads at center and to within 6″ of the ends of all framing members. Where two panels meet on a framing member, apply two beads at the extreme edges of face of framing member to insure adequate contact with each panel. Position panels within 15 min. after adhesive application.

Impact along studs and fasten 16″ o.c. at floor and ceiling. Use 1¼″ (5d) nails or 1¼″ Type W screws for wood framing; 1″ Type S screws for metal framing.

Adhesive Application to Backing Board—Apply TEXTONE Panels to gypsum backing boards or coreboard using specified DURABOND Joint Compound, PERF-A-TAPE Joint Compound-Taping or DURABOND 500 or 600 Adhesive as laminating adhesive. Use a spreader with ¼″x¼″ min. notches. Apply adhesive in strips of four ⅜″ beads 2″ o.c. from center to within 3″ of edges of panel. Apply DURABOND 600 with short-nap roller. Place panel, impact with rubber mallet every 16″, and secure with fasteners 16″ o.c. along floor and ceiling. Use 1¼″ (5d) nails or 1¼″ Type W screws for wood framing; 1″ Type S screws for metal framing. Keep adhesive from contact with vinyl surface; remove immediately as damage can occur within 15 min. Wash with warm water and detergent before adhesive dries. Rinse with clean water and wipe dry.

TEXTONE smoothwall panel application

TEXTONE Smoothwall Panels provide beautiful vinyl-surfaced walls without the usual panel joints. The panels combine the fire resistance of a gypsum board core with a rugged fabric-backed vinyl facing. Available in the same colors and patterns as TEXTONE Gypsum Panels. An extra vinyl flap at each long edge permits job-fabricating a flush joint with a nearly invisible butt seam in the vinyl surface and a continuous non-modular wall finish. See Chapter 1 for full product description of TEXTONE Smoothwall Panels.

installation

Panel Erection—Cut panels to size and tape back vinyl flaps, using care not to crease material at fold. Apply a ⅜″ bead of DURABOND 200 or 300 Adhesive to the face of studs that fall in field of panel. Keep adhesive about 6″ away from ceiling and do not apply adhesive to studs at joints. Keep adhesive from contact with vinyl surface; remove immediately, as damage can occur in 15 min.

If PV-1 Vinyl Trim is used, fasten it to ceiling runner before placing panels. Cut the loose flap of vinyl ⅜″ down from top of panel at a point about 3″ from edge of fabric and fold material down so panel can be inserted under trim.

Install panels vertically with edges centered on studs. Position panels so each joint has a long vinyl flap. Fasten panel to studs at vertical joints and to floor plate or metal floor runner using 1″ Type S screws 12″ o.c. for metal studs; 1¼″ Type W screws spaced 12″ o.c. or 1⅞″ 6d gypsum panel nails spaced 8″ o.c. When using PV-1 Trim or AV-46 TEXTONE Molding, do not attach panels to ceiling plates or runners.

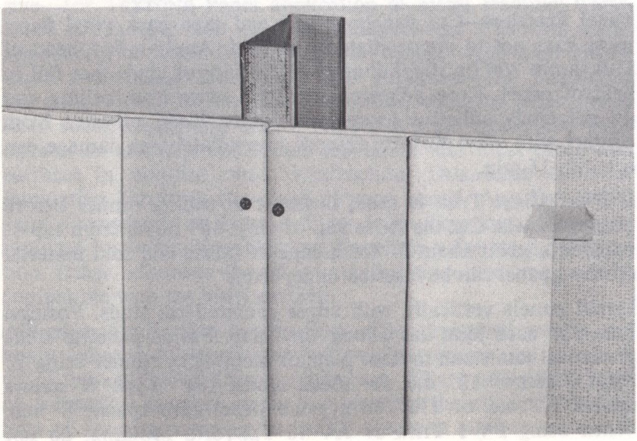
Joint Treatment—Apply a pre-fill of DURABOND 90 Joint Compound to all vertical joints. No tape is needed. Finish joints to a level and smooth surface with either DURABOND 90 or USG Ready-Mixed Joint Compound. Base coats of DURABOND 90 should be hardened but not necessarily dry before following coats are applied. Smooth DURABOND Compound while still wet and before it is fully hardened. With USG Ready-Mixed Compound, re-moisten surface with wet sponge if necessary, level with broad knife. Finish sand surface as necessary. Joints must be smooth and level to obtain the full effect of the TEXTONE Smoothwall surface.

Finishing Vinyl Joints—Both panel edges have loose flaps of vinyl fabric, one flush with the panel edge, the other extending about 2″ beyond the edge. To attach flaps, use a wheat paste equal to Columbus Coated Fabrics Adhesive No. FC-200 or a latex-based adhesive equal to Columbus Coated Fabrics Adhesive No. FC-100. Apply a generous amount of adhesive over entire exposed back area of vinyl using a 4″ brush. Carry well into original adhesive line.

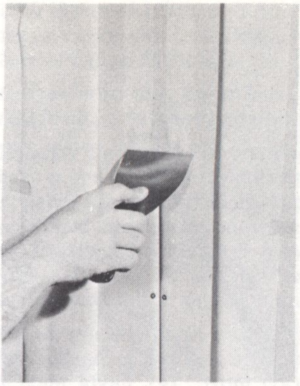
Position short flap over joint and press in place with broad knife, using moderate pressure to remove excess paste and air bubbles. Next, apply longer flap using same technique. No additional adhesive is needed.

Using a razor-tipped tool and with a straightedge as guide, cut through both layers of fabric just inside the fold mark about ½″ from edge of filled joint. Remove trim edge and discard; then lift top flap and remove lower trim strip, starting at bottom of joint and working up.

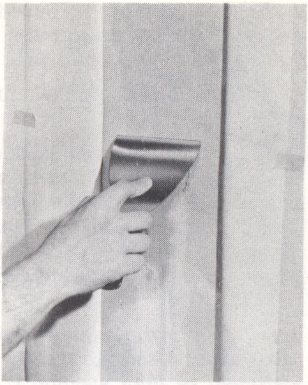
Smooth the surfaces with a 4″ broad knife to form a neat, tight-fitting butt joint and to remove excess paste. Care should be taken not to scuff or gloss the surface of the vinyl when using a broad knife. Roll the joint with a narrow seam roller and finish with wide roller.



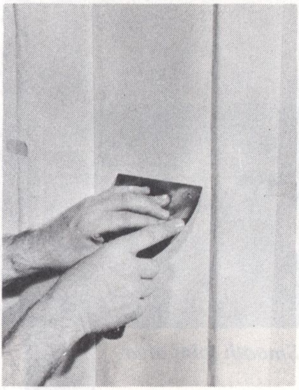
Proper screw location for TEXTONE Smoothwall Panels.



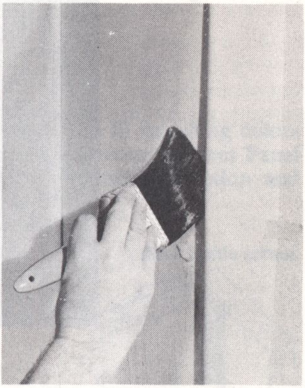
Pre-fill screw-attached joint



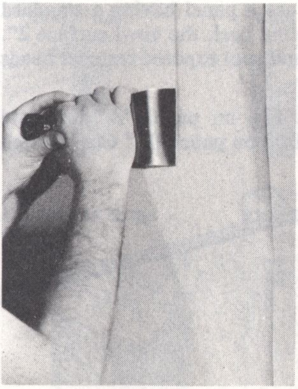
Apply first coat



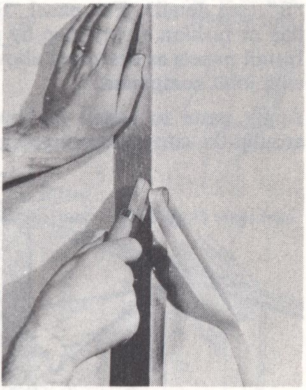
Level the joint



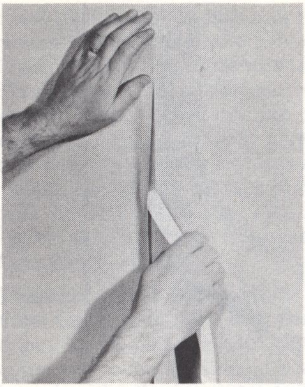
Apply paste



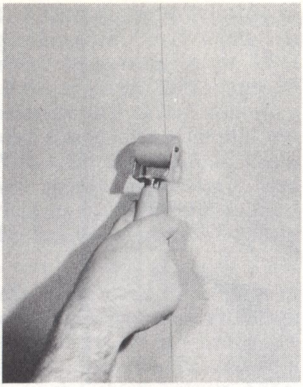
Smooth with broad knife



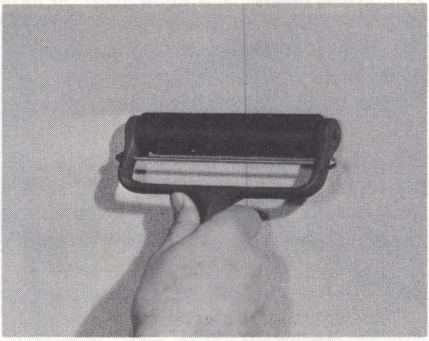
Trim edge strips



Remove trim strips



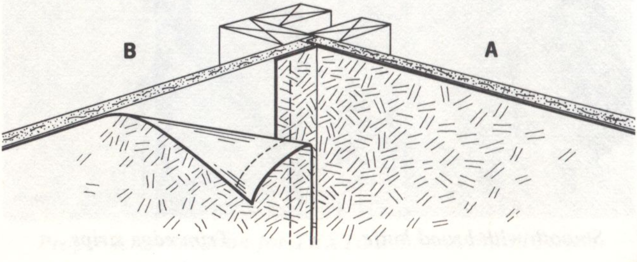
Roll edge flat



Smooth joint area

Interior Corners—For forming inside corners, fashion a vinyl flap on panel "A" that will extend at least 2″ onto abutting panel "B" (see detail). For panel "B," use a panel having a standard flap or fashion a vinyl flap by peeling back the vinyl surface 2″. Install panels as described above and spot exposed fastener heads with joint compound.

Apply paste to panels and work flap on panel "A" into and around the corner, overlapping fabric on panel "B." Cut through



both layers of fabric at a point about 1½″ from corner and remove excess strips of vinyl. Add more paste and roll fabric to form a tight butt joint.

Corners also may be finished with TEXTONE Molding AV-2 as described on following pages.

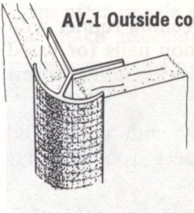
Exterior Corners—For forming outside corners, fashion a vinyl flap on one panel that will extend at least 2″ onto abutting panel. A panel having a standard flap may be used, or a flap may be fashioned by peeling back the vinyl surface 2″. Install panels as described above. Peel vinyl back from corner and apply DUR-A-BEAD or ECONO Joint reinforcement and joint compound as directed later in this chapter.

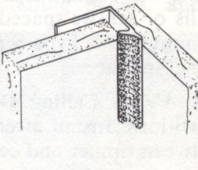
Cover exposed panel and joint compound surfaces with paste, fold extending flap around corner and cut through both layers at a point about 1½″ from corner. Complete joint as described above for interior corners.

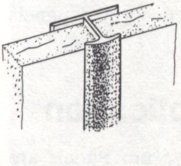
Corners may also be finished with TEXTONE Moldings AV-1 or AV-5 as described on following pages.

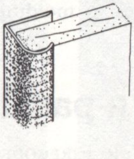
TEXTONE moldings

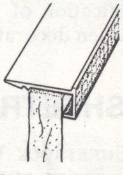
Aluminum moldings and a rigid vinyl trim in matching colors and woodgrains are available to finish TEXTONE Gypsum Panel installations. Refer to Chapter 1 for product description and colors available.

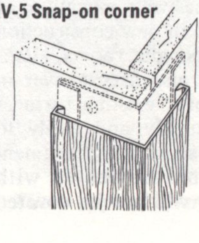

AV-1 Outside corner

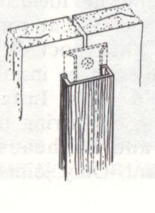

AV-2 Inside corner

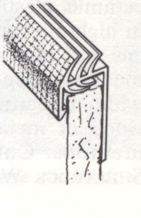

AV-3 Divider


AV-4 End cap


AV-46 Ceiling drive-in trim


AV-5 Snap-on corner


AV-7 Snap-on batten


PV-1 Rigid vinyl trim

installation

1. Start installation from corner or door. Be sure that starting points are plumb and level.

2. Nail moldings with flat head wire nails 8″ to 12″ o.c. or fasten through holes provided in retainer.

3. Cut moldings to length with a fine-toothed hack saw. For mitering use same procedures as with wood molding.

4. AV-1 Outside Corner—Place molding over one panel at corner. Nail exposed side to stud. Insert next corner panel.

5. AV-2 Inside Corner—Place first panel into position. Apply molding over first panel. Insert second panel into place.

6. AV-3 Divider—Place divider on panel before putting into position. Nail exposed back flange to stud. Insert butting panel.

7. AV-4 End Cap—Apply panel to wall. Tap end cap molding into position. Also available are steel end caps, SV-401 and SV-402, with flat reveals.

8. AV-5 Snap-on Corner—Apply panels using adhesive or adhesive nail-on application. Place retainer strip over corner and fasten both sides with nails or screws driven through holes provided. Snap corner face over retainer strip.

9. AV-7 Snap-on Batten—Apply panels using adhesive or adhesive nail-on application. Place retainer strip over joint and fasten with nails or screws driven through holes provided. Snap batten face over retainer strip.

10. PV-1 Rigid Vinyl Trim—Fasten trim to ceiling runner with nails or screws spaced 12″ o.c. Use 4d common nails for wood framing; ⅜″ Type S pan head screws for metal framing. Insert panel in place.

11. AV-46 Ceiling Drive-in Trim—Use only with metal stud partitions. Install after panels are applied. Insert grooved flange between runner and ceiling; tap trim into place.

12. If moldings other than TEXTONE Moldings are used, they should be decorated prior to application over panels. Avoid application of masking tapes to moldings or predecorated panels when decorating.

SHEETROCK W/R panels application

SHEETROCK W/R and W/R FIRECODE "C" Gypsum Panels are superior water-resistant bases for the adhesive application of ceramic, plastic and metal tile. Ideal for use in new construction in high-moisture areas such as bathrooms, powder rooms, kitchens and utility rooms. SHEETROCK W/R is also a cost-saver in modernization—new tile can be installed over existing surfaces without tearing out old walls. Installs quickly and easily to wood or metal framing or furring using standard attachment methods. Cut edges and nailheads should be coated with SHEETROCK W/R Sealant. Only joints that will *not* be covered with tile need be taped. Once these joints are finished, they are ready for regular application of paint or wallpaper. See Chapter 3 for application of SHEETROCK W/R FIRECODE "C" Panels to meet fire ratings.

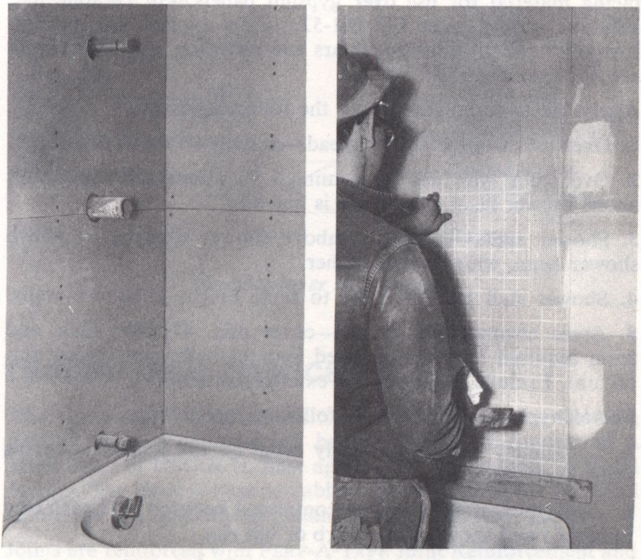
installation

Framing—Check alignment of framing. If necessary, fur out studs around shower receptor so that inside face of lip of fixture will be flush with gypsum panel face (see details).

Install appropriate blocking, headers, or supports for tub and other plumbing fixtures, and to receive soap dishes, grab bars, towel racks or similar items. SHEETROCK W/R is designed for framing 16″ o.c. but not more than 24″ o.c. When framing is spaced more than 16″ o.c., or when ceramic tile over 5/16″ thick will be used, install suitable blocking between studs. Place blocking approximately 1″ above top of tub or receptor and at midpoint between base and ceiling. Blocking is not required on studs spaced 16″ o.c. or less. Vapor barriers should not be installed between SHEETROCK W/R Panels and framing.

Receptors—Install receptors before panels are erected. Shower pans, or receptors, should have an upstanding lip or flange at least 1″ higher than the water dam or threshold at the entry to the shower.

W/R Gypsum Panels—Place temporary ¼″ high spacer strips around lip of tub, shower pan or receptor to create separation between bottom edge of gypsum panels and fixture. (Remove strips after panels are installed.) Pre-cut panels to required sizes and make necessary cut-outs. Before installing panels, apply



Tile is applied after SHEETROCK W/R Panels are caulked.

SHEETROCK W/R Sealant to all cut or exposed panel edges at utility holes and joints, including those at wall intersections.

Install SHEETROCK W/R Panels horizontally with long (paper-bound) edges abutting top of spacer strip. Fasten panels with nails 8″ o.c. max., or screws 12″ o.c. max. *Exception:* Where ceramic tile more than 5⁄16″ thick will be used, space nails 4″ o.c. max. and screws 8″ o.c. max.

Alternate: Where ceramic tile no more than 5⁄16″ thick will be used, panels may be installed using Adhesive Nail-on method of attachment with DURABOND 200 Adhesive and fastener spacing applicable to ceilings.

In areas to be tiled, treat all fastener heads with SHEETROCK W/R Sealant but do not apply joint compound to joints or fastener heads. Apply U.S.G. joint treatment only to joints and fasteners *not* to be tiled. Tape all interior angles to minimize cracking.

For improved fire and sound resistance, install W/R Panels below tub rim blocking to the floor (see details). Where sound control is required, the wall must be treated the same as for regular gypsum panels. However, resilient attachment of panels is not recommended where tile is to be applied.

Tile—Prior to tile erection, fill all openings around pipes, fittings, fixtures, etc. with waterproof, non-hardening caulking compound such as USG Acrylic Caulk. Do not fill gap formed by temporary spacer at bottom edge of panels.

Use an adhesive approved by the manufacturer of tile or surfacing material for use over gypsum panels. For ceramic tile, adhesive should meet CS 181-52. Water-thinned tile mastics, hydraulic cement thinset mortars and emulsion type tile mastics are not recommended.

Apply tile to completely cover the following areas:

1. Over tubs without shower heads–at least 6″ above rim of tub.

2. Over tubs with showers—min. 5 ft. above tub rim or 6″ above shower head, whichever is higher.

3. Shower stalls—min. 6 ft. above shower dam or 6″ above shower head, whichever is higher.

4. Shower stall jambs—cover to same height as shower stalls.

5. Areas beyond face of tub—cover min. 4″ from face, and from required height to finished floor of bathroom (below rim of tub). Exclude areas beyond exterior corners.

For all types of tile, take the following precautions:

1. Completely and continuously grout all tile joints to prevent water penetration.

2. Apply nonsetting caulking compound between wall surfacing materials and shower floor, curb or tub rim.

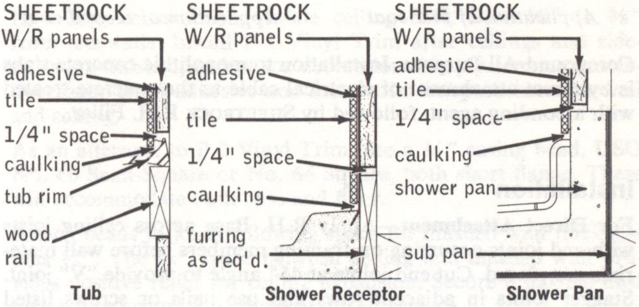
3. Caulk angle between tub edge and surfacing.

Decoration—Apply decorating materials according to the following recommendations:

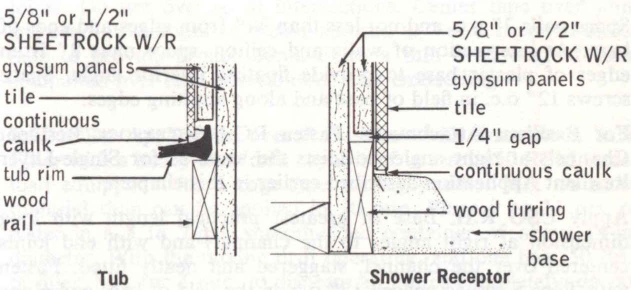
1. Prime coat—Seal SHEETROCK W/R Panels with USG Alkyd Enamel Undercoat or SHEETROCK Sealer.

2. Finish coat—Apply USG Satin-Lustre Semi-Gloss Enamel, DIAMOND Lustre or Eggshell Enamel.

3. In moist areas where wallpaper is desired, prime panels in the same manner as for paint, above. When prime coat is dry, apply coat of sizing for good adhesion of wallpaper.



Single-layer application

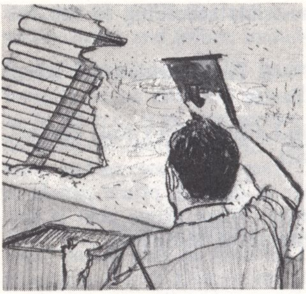


Double-layer application

radiant heat application

The SHEETROCK Radiant Heat System is designed for finishing drywall ceilings with electric heating cables. It consists of a single layer of USG R.H. Base applied over wood joists or metal furring. The electric heating cables are attached to the base and embedded in a specially formulated SHEETROCK R.H. Filler.

Joints are reinforced with PERF-A-TAPE Joint Reinforcement and DURABOND Joint Compound-Taping or USG Ready-Mixed Joint



Application of first coat

Application of second coat

Compound-All Purpose. Installation to monolithic concrete slabs is by direct attachment of electrical cable to the concrete treated with a bonding agent, followed by SHEETROCK R.H. Filler.

installation

For Direct Attachment—Apply R.H. Base across ceiling joists with end joints occurring on framing members before wall materials are placed. Cut end joints at 45° angle to provide "V" joint. Stagger joints in adjacent rows and use nails or screws listed below for attachment. Drive fasteners from center of R.H. Base to ends and edges while holding base firmly to underlying support. Use control joints and provide perimeter relief as application proceeds.

Space nails 7″ o.c. and not less than ⅜″ from edges and ends of base. At intersection of walls and ceiling, space nails 8″ from edges of plaster base to provide floating interior angle. Space screws 12″ o.c. in field of base and along abutting edges.

For Resilient Attachment—Fasten RC-1 SHEETROCK Resilient Channels at right angles to joists the same as for Single-Layer Resilient Application described earlier in this chapter.

Apply USG R.H. Base of greatest practical length with long dimension at right angles to the channels and with end joints centered over the channel, staggered and neatly fitted. Fasten with Type S screws spaced 12″ o.c. in the field of base and along abutting edges. Use 1″ screws for ½″ or ⅝″ base. Space ⅜″ from edges or ends of base.

For metal furring channel attachment, see grillage erection described earlier in this chapter. Application of radiant heat base to metal furring channels is same as for resilient channels, above.

In thermal zones 3, 4 and 5 as defined in the National Electric Manufacturers' Association map, where radiant heat ceiling is attached to wood frame members which also support a roof (as flat roof construction), control joints and perimeter relief must be provided.

On ceilings areas exceeding 500 sq. ft. with any single dimension exceeding 25 lin. ft., base and filler must be broken with control joints. For standard ½″ radiant heat base and ¼″ radiant heat filler installations, use USG No. 75 Control Joint.

Attach control joints to joists with Bostitch 9⁄16″ G staples or nails no more than 6″ along each flange or to furring channels by wire-tying. Cut end joints square and butt together, aligned for neat fit. Remove protective tape when joint treatment is completed.

For Perimeter Relief—Use USG P-2 Vinyl Trim at ceiling and wall intersections. This ½″x¾″ U-shaped trim comes with pressure-sensitive adhesive backing for easy attachment.

In ceiling construction, isolate ceiling R.H. Base ⅛″ to ⅜″ from sidewalls. Install P-2 Vinyl Trim after ceilings and sidewalls are finished, except for decoration. Simply remove protective paper from adhesive and insert trim in space between wall and ceiling.

As an alternate to P-2 Vinyl Trim, use a ¾″ casing bead, USG No. 60 Semi-Square or No. 66 Square, both short flange. These will accommodate both base and filler.

Attach beads to joists, allowing space for finished wall thickness plus ⅛″. The ⅛″ space between ceiling and finished wall provides positive relief for ceiling expansion. Secure a flexible dust membrane behind R.H. Base and wall surface.

Joint Treatment—Apply reinforcing tape with a thin, uniform layer of joint compound over full length of all end and edge joints. Do not overlap at intersections. Center tape over joint and seat into compound. Leave approx. 1⁄32″ of compound under tape to provide proper bond. Skim a thin even coat of joint compound over tape immediately after embedding.

R.H. Filler Application over R.H. Base—Mix SHEETROCK R.H. Filler with a heavy-duty drill capable of at least 650 RPM under load equipped with a cage-type mixing paddle. Mix no more material than can be applied in 30 min. Place 9 to 11 qts. of water in a 5 to 7-gal. smooth-sided container of about 14-in. diameter. With the mixing drill operating, add one bag (50 lbs.) of filler. Mix for 3 min. to disperse all lumps completely; do not mix longer than 6 min. Filler will thin down to desired consistency within the first 2 min. of mixing. Add water to thin consistency only after at least 2 min. mixing.

Apply filler to depth of cables with a drywall knife or trowel, working parallel to direction of cables. Immediately double back with a ⅛″ coat for a total thickness of ¼″ to ⅜″, and finish surface smooth.

optional finishes

Smooth Finish—Apply COVER COAT Drywall Compound over filler. Smooth COVER COAT to receive paint or leave with natural finish, as desired.

Sand Float Finish—Add up to 12 lbs. of clean, white silica sand per 50 lbs. of filler. Apply this mixture and, when firm but not hard, float to provide texture with sponge, carpet or other float.

Spray Texture—Spray 1/8″ max. thickness of IMPERIAL QT Texture Finish. This type of finish will decrease heating efficiency slightly since simulated acoustical finishes are formulated with insulating-type aggregates.

R.H. Filler Application over Monolithic Concrete—Temperature of concrete must be above 30°F. and temperature of air above 55°F. before installation of filler.

Apply liquid bonding agent to concrete according to manufacturer's directions.

Apply filler to depth of cables, then double back with 1/8″ coat for total thickness of 1/4″ to 3/8″. Finish surface smooth to receive decoration.

gypsum sheathing application

USG Gypsum Sheathing, with an asphalted gypsum core, provides a top-quality base for a wide range of exterior finishes—wood clapboard or aluminum siding, masonry veneer, wood and asbestos shingles, and stucco. It is widely used for garden apartments and light commercial construction as well as for homes.

installation

Apply 2x8-ft. tongue-and-groove-edge USG Gypsum Sheathing horizontally with "V" groove facing down, using diagonal bracing or supplemental nailing through exterior finish material. Use 11-ga. galvanized roofing nails 1½″ or 1¾″ long with 7/16″ heads. Space nails 8″ o.c. at each stud. To apply sheathing without diagonal bracing or supplemental nailing, space nails 4″ o.c. at each stud (7 nails per 2-ft. width per stud). Apply 4x8-ft. or 9-ft. square-edge USG Gypsum Sheathing vertically. Space fasteners 4″ o.c. around entire perimeter of board and 8″ o.c. on intermediate framing members.

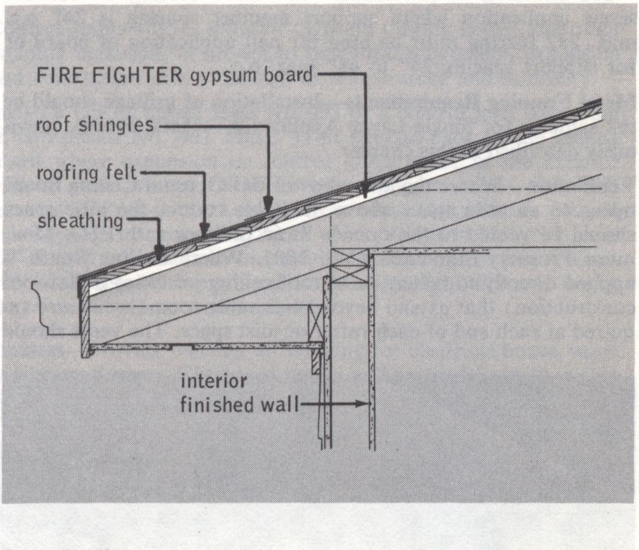
For staple application, use 16-ga. galvanized divergent-point staples, nom. ½″ wide, 1½″ long with same spacing as for nails.

Drive staples parallel to long dimension of framing members, heads flush with sheathing surface but not breaking face paper.

Refer to U.S.G. Booklet GS-102 for optional inclusions on sheathing application. Refer to separate Curtain Wall Handbook for sheathing application to 20-ga. USG Metal Studs.

FIRE FIGHTER board application

In wood frame construction, USG FIRE FIGHTER Gypsum Board provides effective protection against roof or attic fires when installed under roof sheathing. In full-scale tests, FIRE FIGHTER confined roof fires to the roof and kept attic fires from spreading. Particularly adaptable to light commercial construction, garden apartments and single-family residences.



installation

Install FIRE FIGHTER Board over roof framing spaced no more than 24″ o.c. Apply board with long dimension across framing and with light-colored face down. Center end-joints over framing. Fasten FIRE FIGHTER Board to each framing support with two galvanized nails per board width. Use any galvanized nail that is at least 1¼″ long and suitable for application of gypsum sheathing or plywood roof sheathing. To eliminate damage to FIRE FIGHTER Board, apply roof sheathing or stripping immediately after application of the board, which is not designed to support workmen or stacked shingles between roof framing. Apply roof covering immediately after sheathing or stripping to protect board from precipitation.

exterior ceiling board application

USG Exterior Gypsum Ceiling Board embodies a specially treated gypsum core encased in chemically treated fiber paper. The result—an ideal surface material for sheltered exterior ceiling areas. Typical commercial applications include covered walkways and malls, large canopies and parking areas. In residences, Gypsum Ceiling Board is used for open porches, breezeways, carports and exterior soffits.

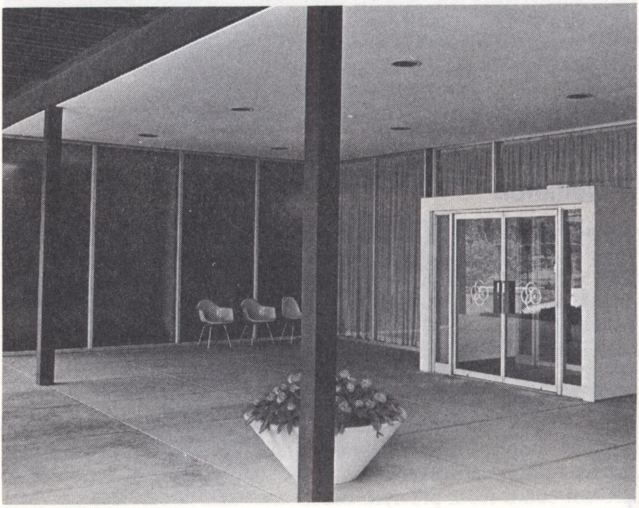
Moisture, fire and sag-resistant, ½″ thick, USG Exterior Gypsum Ceiling Board provides durable, smooth surfaces at pleasingly low cost. It may be applied directly to wood framing or to cross furring of wood or USG Metal Furring Channels attached to main supports.

special conditions

Wood Framing Requirements—1x4 wood furring is used for screw application where support member spacing is 24″ o.c. max. 2x2 furring *must* be used for nail application of board or for support spacing 24″ to 48″ max. o.c.

Metal Framing Requirements—Installation of grillage should be the same as for Single-Layer Application—Metal Frame, previously described in this chapter.

Ventilation—Where the area above USG Gypsum Ceiling Board opens to an attic space above habitable rooms, the attic space should be vented to the outside in accordance with FHA Minimum Property Standards (No. 300). Where Ceiling Board is applied directly to rafters or to roof-ceiling joists (as in flat-roof construction) that extend beyond habitable rooms, vents are required at each end of each rafter or joist space. The vents should



be screened and be a minimum 2″ x full width between rafters (or joists). Vents should be attached through board to min. 1″x2″ backing strips installed before board. Vent openings should be framed and located within 6″ of outer edge of eave.

Weather Protection—At the perimeter and at vertical penetrations, the exposed core of panels must be covered with No. 401 Metal Trim or securely fastened moldings.

In areas subject to freezing temperatures and other severe weather conditions, shingled roofs should be installed in accordance with locally approved roofing practices.

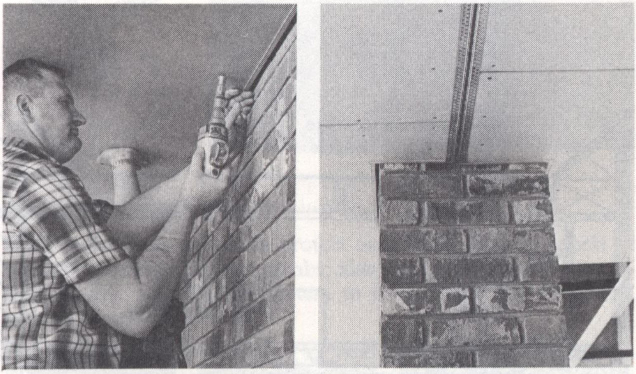
Fascia boards should extend at least ¼″ below the ceiling board or adjacent trim moldings, whichever is lower.

Intersections—A space of at least ¼″ should be provided between edge of exterior ceiling board and adjacent walls, beams, columns and fascia. This space may be screened or covered with molding but must not be caulked.

Control Joints—USG Exterior Gypsum Ceiling Board, like other building materials, is subject to structural movement, expansion and contraction due to change in temperature and humidity.

Install a USG Control Joint No. 093 or a control joint consisting of two pieces No. 401 Metal Trim back-to-back in the ceiling board where expansion or control joints occur in the exterior wall or roof. Where aluminum H-moldings are used, they will serve as control joints. Long narrow areas should have control joints spaced no more than 30 ft. apart. Wings of "L", "U", and "T"-shaped areas should be separated with control joints. Control joints usually are placed to intersect light fixtures, vents, etc. to relieve stress concentrations.

Fixtures—Provide backing or blocking for electrical boxes, vents and heavy fixtures. Cut board neatly and accurately to fit within ¼″ of fixtures and vents. Cover openings with trim.

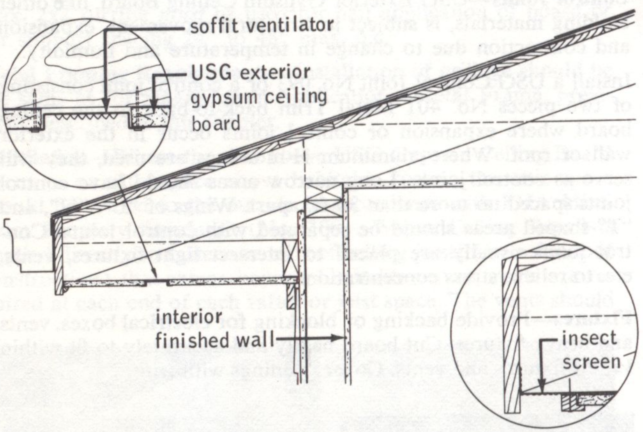


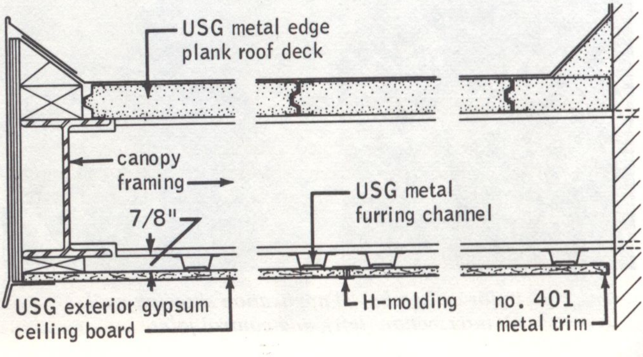
Exterior ceiling board application showing wall intersection (left), and control joint.

installation

Apply exterior ceiling board with long dimension across supports (horizontally) or parallel to supports (vertically). Position end joints over supports. Use maximum practical lengths to minimize end joints. Allow 1/16″ to 1/8″ space between butted ends of board. Fasten board to supports with screws spaced 12″ o.c. or nails spaced 8″ o.c.

For metal framing, use 1″ Type S screws. For wood framing, use 1¼″ Type W screws or 1½″ galvanized box nails or 1½″ aluminum nails. Treat fasteners and finish joints using DURABOND Exterior Joint System described later in this chapter. If desired, panel joints may be concealed with batten strips or by installing panels with ends installed into aluminum H-moldings. Fasten H-moldings to supports with screws spaced 12″ o.c. or nails spaced 8″ o.c.




USG metal edge plank roof deck
canopy framing
7/8″
USG metal furring channel
USG exterior gypsum ceiling board
H-molding
no. 401 metal trim

trim accessory application

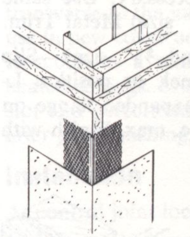
U.S.G.'s broad line of trim accessories provides simplified and dependable finishing of gypsum panel assemblies. The accessories are low in cost, easily applied and designed to work together in systems for long-lasting and trouble-free drywall construction.

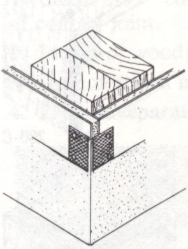
See Chapter 1 for product description, sizes and lengths available. See page 120 for joint compound application.

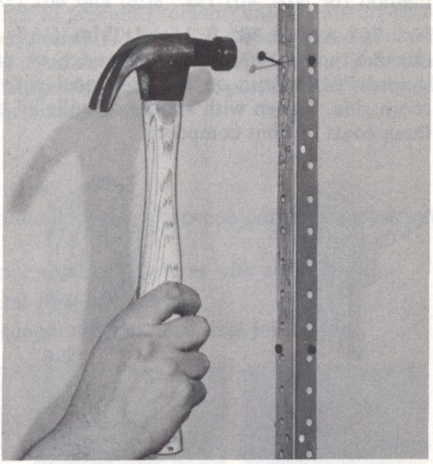
corner bead application

Metal corner reinforcements provide strong, durable protection for outside corner angles, uncased openings, pilasters, beams and soffits. The exposed nose resists impact and forms an exact screed for finishing smooth corners. Corner bead should be used in one piece unless length of corner exceeds stock lengths. Install as follows:

No. 900 Corner Bead, DUR-A-BEAD and ECONO Reinforcement—Apply corner bead with drywall nails (below) or screws spaced 6″ apart in both flanges; nails opposite. Fasten to framing through panel. Finish with three coats of joint compound.







metal trim application

USG Metal Trim serves to protect and finish gypsum panels at window framing and door jambs; also used at ceiling-wall intersections and partition perimeters to form recess for acoustical sealant. Install as follows:

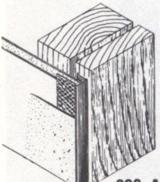
No. 200-A USG Metal Trim (½″ and ⅝″ size)—Apply gypsum panels, omitting fasteners at framing member where trim is installed. Leave a space ⅜″ to ½″ wide between edge of panel and face of jamb. This provides space for hardware or door bucks. Slip trim over edge of panel with wide knurled flange on room side and fasten trim and panel to framing. Use same type fasteners used to attach panels; space fasteners 9″ o.c. max. Finish with three coats of joint compound.

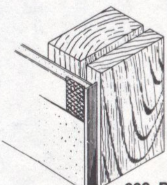
No. 200-B USG Metal Trim (½″ and ⅝″ size)—Apply gypsum panels same as for No. 200-A trim, omitting fasteners and leaving ⅜″ to ½″ space at jamb. Place trim over edge of panel with knurled flange exposed. Attach trim and panel to framing with fasteners spaced 9″ o.c. max. Finish with three coats of joint compound.

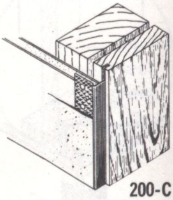
No. 200-C USG Metal Trim—This trim requires a slotted jamb for installation. Before installation, kerf door and window jambs ⅛″ wide and ½″ deep, kerf being ⅜″ back from face of jamb. Apply gypsum panels same as for No. 200-A trim, with edge of panel bordering kerf. Insert plain trim flange in kerf, with knurled flange over panel face. Attach trim and panel to framing with fasteners spaced 9″ o.c. max. Finish with three coats of joint compound.

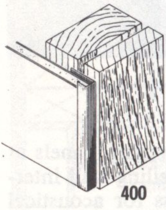
No. 400 USG Metal Trim (⅜″ size)—Apply trim to wall before gypsum panel goes up, by nailing into framing through long leg about 9″ o.c. Slide panel into channel; it is firmly held in place by short leg. No further edge nailing is necessary. Use same method for Nos. 401 (½″ size) and 402 (⅝″ size) Metal Trim.

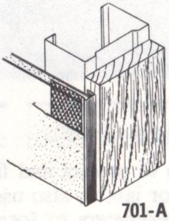
No. 701-A and 701-B Metal Trim (½″ and ⅝″ size)—Slip channel-type 701-A Trim over edge of panel, or position L-shaped 701-B Trim on edge of panel with expanded flange on room side. Fasten with staples or nails 9″ o.c. max. Finish with three coats of joint compound.

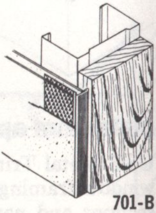

200-A


200-B


200-C


400


701-A

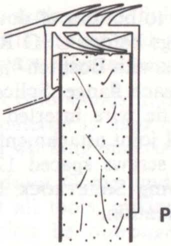

701-B

vinyl trim application

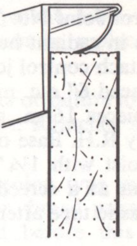
For structural relief and effective sound control, USG Vinyl Trim finishes edges of gypsum panels and acts as a seal where the panel adjoins dissimilar structural surfaces. Install as follows:

USG P-1 Vinyl Trim (P-1A, ½″ size; P-1B, ⅝″ size)—Apply trim to edges of gypsum panels that will abut ceilings or walls. Slip trim over edges of panels for friction fit. Position panels, press trim edges against abutting surfaces for a snug contact and attach in usual manner. Use same procedure for P-1A and P-1B.

USG P-2 Vinyl Trim—Provide ⅛″ to ⅜″ relief at perimeter of radiant heated ceilings. Remove protective paper from adhesive on trim and insert trim into relief, with adhesive against wall surface. Press trim upward until long flange seats against ceiling.



P-1



P-2

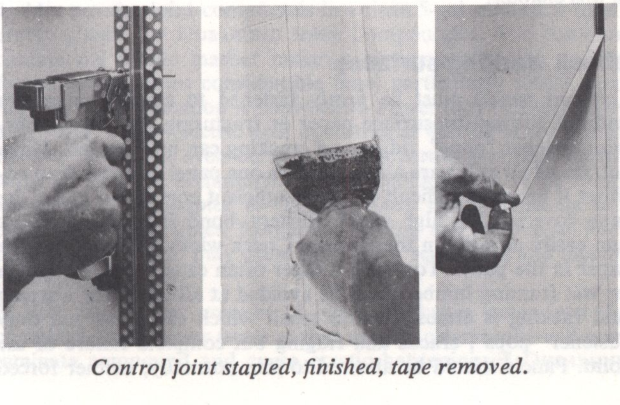
control joint application

USG Control Joints relieve stresses of expansion and contraction transverse to the joint in large wall and ceiling areas. Suitable for use in new construction to prevent problems and in existing construction as a remedy. Also required in wood-framed radiant heated ceilings. Made of corrosion-resistant zinc with a ¼″ wide slot and perforated flanges for stapling. A plastic tape, removed after joint finishing, protects the slot.

installation

At control joint locations:

1. Leave a ½″ continuous opening between panels for insertion of control joint.
2. Interrupt wood floor and ceiling plates with a ½″ gap.
3. Do not attach metal studs to runners.
4. Provide separate supports for each control joint flange.

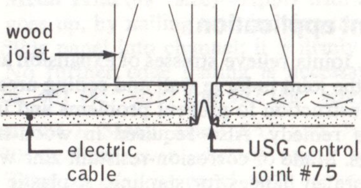


Control joint stapled, finished, tape removed.

5. Provide an adequate seal behind control joint where sound and/or fire ratings are prime considerations.

USG Control Joint No. 093—Apply over face of gypsum panels where specified. Cut to length with a fine-toothed hack saw (32 teeth per in.). Cut end joints square, butt together and align to provide neat fit. Attach control joint to gypsum panels with Bostitch ½″ Type G staples spaced not over 6″ o.c. in each flange. Finish with three coats of joint compound. Remove plastic tape after finishing.

USG Control Joint No. 75—Apply to bottom of double row of wood joists in radiant heated ceilings before USG R.H. Base is applied. Attach control joint to joists with Bostitch 9⁄16″ G staples or nails spaced 6″ o.c. max. along each flange. Splice end joints with two pieces 16-ga. galvanized tie wire inserted in the sections. Apply R.H. Base over control joint attachment flange and fasten to joist with 1¼″ Type W screws spaced 12″ o.c. Use control joint as a screed for applying SHEETROCK R.H. Filler. Remove plastic tape after filler application.



joint treatment application

application conditions

In cold weather during joint finishing, temperatures within the building should be maintained within the range of 55° to 70°F. and adequate ventilation should be provided as described earlier in this chapter. Also see "Tips for Joint Finishing" found later in this chapter.

check working surfaces

Gypsum panels must be *firmly* fastened to framing members without cutting the surface paper or fracturing the core. Otherwise fastener "pops", ridges and cracking can be expected. Make certain panel joints are aligned. When one panel is higher than another it becomes difficult to leave sufficient compound under the tape covering the high panel. Blisters, bond failure and cracks can easily develop in these areas. Check width and depth of the taper in the panel. Too deep a taper often causes trouble. Green or wet framing lumber must be avoided at all costs, for warping and racking is almost sure to result which can cause not only fastener "pops", cracks and ridging but complete failure of the joint. Panels should be allowed to join normally, neither forced together or spaced apart. Open spaces between panels of ¼″ or more should be filled with compound at least 24 hours prior to embedding or first coat work. Good planning prior to hanging panels will eliminate many unnecessary joints and avoid joints formed by more than two panels.

care of equipment

As with other crafts, applicators should keep tools and equipment clean and in good repair to secure maximum benefits. Mechanical taping and finishing equipment must be kept in perfect working order and all parts *must* be replaced as soon as they show the slightest signs of wear.

Mixing joint compounds in dirty buckets or failure to wipe down bucket as material is used causes lumps, scratches and usually creates hard working material.

DURABOND Joint Compounds are hardening type materials requiring that all tools, mixing containers, bread pans, etc., used for application be *thoroughly* cleaned before this hardening action occurs. Care of equipment is beyond our control and, therefore, United States Gypsum cannot assume any responsibility for any loss or damage to equipment.

Flush and clean DURABOND Joint Compounds from equipment with a conventional garden hose and brush before the hardening action takes place. *Immersion of equipment in water will not prevent hardening of the compound.*

Ames Tools—Automatic Taper (Bazooka): Remove head plate and thoroughly clean upper plunger area. Use narrow stiff bristle brush to clean head mechanism. Flush tube.

Hand Pump: Pump water through pump until clean. Remove bottom screen and flush this area of pump and screen.

Finishing Boxes, Corner Roller, Corner Finisher: Release plunger plate to simplify cleaning box. Flush with water until clean.

mixing joint compounds

1. Mix powder joint compounds in a clean 5-gal. container (preferably plastic for DURABOND Joint Compounds). The common commercial potato masher makes a convenient mixing paddle. Power mixing saves considerable time, particularly where mixing in a central location is convenient. Power may be supplied by a ½″ heavy duty electric drill operating at 400 RPM maximum (200 to 300 RPM even better). Drills operating at high speeds whip air into the compound. Mixing paddles may be of many variations (see Chapter 6—Tools). Keep mixing buckets and tools clean at all times. Containers having any residue of joint compounds in them may cause hardening, scratching and incompatibility problems.

2. Pour the proper amount of clean drinkable water into the container. Dirty water (such as that used to clean tools) will contaminate compound and cause erratic hardening of DURABOND compound. The amounts for type of application and powder are shown below and on the bag.

3. Sift the joint compound into the water, allowing complete wetting of the powder.

Table of Liquid Measures

	Ready-Mixed Pail	Standard 5-gal. Pail
Height—in.	13½	13
Diameter (Top)—in.	11¾	11¾
Diameter (Bottom)—in.	10¾	10¾
Pints	**Depth—in.**	**Depth—in.**
13	4¼	4¼
14	4½	4½
15	4¾	4¾
16	5	5
17	5½	5¼
18	5¾	5¾
19	6	6
20	6½	6¼
21	6¾	6½
22	7	6¾
23	7¼	7
24	7½	7½
25	8	7¾
26	8¼	8

Notes: All measurements to nearest ¼″. Container dimensions are exterior. Depth measured in center of container.

Recommended Water Quantity
(Pints per 25-lb. Bag)

Type Compound	Hand Application	Mechanical Application			Texturing
		Taping	Fill	Finish	
DURABOND Joint Compound					
Taping	13½	17½	15½	—	
90	14	18	16	—	
XL	13½-14	—	14½-15	—	
USG Joint Compound					
Taping	16	19	17	—	
Topping	16½	—	16½	18	
All Purpose	15	17	15	16	25
PER-A-TAPE Joint Compound					
Taping	16½	19½	18	—	
Topping	16	—	16	17½	
All Purpose	16	18	16	17	25

4. Mix as shown below:

a. For DURABOND Joint Compound-Taping and 90, stir vigorously for approximately 3 minutes, making sure all compound is uniformly damp. If any batch lumps are present, allow the mix to soak for a minute or two. Re-mix the compound until smooth, and it is ready to use. DURABOND XL must be machine-mixed. See page 121 for details. *Note:* Keep the compound from being contaminated by any other materials such as other type joint compounds, dirty water or previously mixed DURABOND Joint Compound. Contamination will affect the hardening time and properties of the compound.

Mix only as much DURABOND Joint Compound as can be used within time period shown on bag (usually 2 hours for Taping, 1 hour for DURABOND 90 and 30 minutes for DURABOND XL). The compound will harden chemically after this time period even under water. Do not attempt to hold wet mix or immerse joint compound coated tools in water to hold back hardening. Retempering the compound is not recommended.

b. For USG Brand Joint Compounds, stir until the powder is uniformly damp, then after 3 to 5 minutes remix vigorously until smooth. *Note:* Do not add extra water. Use specified amounts of water, as USG Joint Compounds will retain their original mixed consistency over extended periods. On occasions, some slight liquid separation or settlement of compound may take place in the bucket, but a brief remix will restore the compound to its original consistency.

c. For PERF-A-TAPE Joint Compounds, stir vigorously for about 1½ minutes—be sure all compound is uniformly damp. At this point, the mixture will appear somewhat dry and mealy. Do not add additional water. Excess water will not accelerate solution process although compound may appear to be workable.

Let mix soak for 30 minutes (longer at lower temperatures) to allow proper solution of the material. After soaking, stir 2 or 3 minutes until the mixture is a creamy, smooth consistency. Compound is now ready to use. *Note:* It is better to have a heavy consistency at the end of the soaking period, for then additional clean room-temperature water may be added, if necessary, to thin. To thicken mixture, add small amounts of compound, soak for 30 minutes and remix as described above.

d. For USG Ready-Mixed Joint Compounds, use at package consistency to minimize shrinkage. If a thinner material is desired, Ready-Mixed can be quickly and easily thinned with water using a potato masher-type mixing paddle. A drill-type mixer is not recommended as this tends to whip air into the compound. Add the water gradually to speed the thinning process. When possible use cool to lukewarm (not hot) water. If applicator should inadvertently over-thin, simply add additional Ready-Mixed Compound to thicken and remix. To hold the wet mix in a metal container for prolonged periods, cover with a damp cloth or a thin layer of water. Pour off water, retemper for use.

Recommended Water Quantity (Qts. per 5-gal. Can)

Type Compound	Hand Application	Mechanical Application			Texturing
		Taping	Fill	Finish	
USG Ready-Mixed Joint Compound					
All Purpose	1	5	2	2	8
Topping	1	—	2	2	8

Ready-Mixed Compound is sensitive to cold weather and must be protected from freezing. If material freezes in container, allow it to thaw at room temperature (do not force the thawing process). Retemper and usually it will again be usable, *unless* it has been subjected to several freeze-thaw cycles.

Ready-Mixed Compound can be used in tools and containers previously used for powder compound without thoroughly cleaning them.

application recommendations

Following are general recommendations for the interior application of joint compounds listed in order of preference—No. 1 in each case can be expected to provide the highest quality results:

First Coat: embedding tape; first coat over beads; spotting fasteners	Second Coat: filling over tape, beads and fasteners	Third Coat: finishing over tape, beads and fasteners
1. DURABOND Compound-Taping	DURABOND Compound-Taping	USG Ready-Mixed Compound-Topping or USG Compound-Topping
2. USG Ready-Mixed Compound-All Purpose	USG Ready-Mixed Compound-Topping or All Purpose	USG Ready-Mixed Compound-Topping or All Purpose
3. USG Compound-Taping	USG Compound-Topping	USG Compound-Topping
4. USG Compound-All Purpose	USG Compound-All Purpose	USG Compound-All Purpose
5. DURABOND 90 Compound	DURABOND 90 Compound	USG Ready-Mixed Compound-Topping or USG Compound-Topping
6. PERF-A-TAPE Compound-Taping	PERF-A-TAPE Compound-Topping	PERF-A-TAPE Compound-Topping
7. PERF-A-TAPE Compound-All Purpose	PERF-A-TAPE Compound-All Purpose	PERF-A-TAPE Compound-Topping or All Purpose

A joint system serves to conceal and reinforce joints between Gypsum Sheetrock Panels at flat butt joints, vertical corners and wall-ceiling intersections. Joint compound effectively conceals exterior corner reinforcements and exposed fasteners; repairs damaged gypsum panels to provide smooth continuous interior walls and ceilings ready for decoration. USG Joint Compound-All Purpose and Perf-A-Tape Joint Compound-All Purpose also can be used as wall texturing material or as a thin-coat finish. Joint treatment is not required with predecorated Textone Vinyl Panels.

These outstanding qualities have been developed in U.S.G. joint compounds: easy mixing, smooth working, ample wet-mix life, good bond, minimum shrinkage, tight cohesion, minimum edge cracking, easy sanding, and no alkali burning of paint.

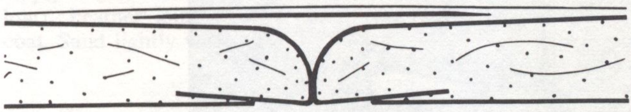
In reinforcing tape, U.S.G. has incorporated superior qualities of strength—as strong as the board itself—plus wafer-thinness for easy embedding, spark perforations to avoid air pockets and photographing, chamfered edges to resist cracking, pre-creasing for easier folding, and a natural bond with the compound.

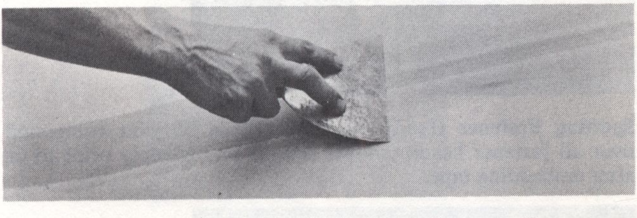
To better solve the problems of the builder and drywall contractor, U.S.G. offers four groups of compounds for joint reinforcement of gypsum panels:

USG Brand Joint Compounds—a complete group of non-casein type powder compounds that are ready for use as soon as mixed, are stable in wet mix consistency, have smoother application properties and are free of objectionable wet-mix odors; **PERF-A-TAPE Joint Compounds**—still the standard of excellence among casein type powder products used for embedding tape and finishing; **DURABOND Joint Compounds**—polyindurate type powder compounds designed for quick hardening and one-day finishing, fast application, reduced shrinkage, earlier occupancy —ideal when drying conditions are slow and for exterior application; **USG Ready-Mixed Joint Compounds**—ready for immediate embedding or finishing, saving time and waste on the job; are applied in same manner as other joint compounds. All-Purpose is used for embedding tape and finishing; Topping for fine finishing and as first coat over corner bead, trim and fasteners. Use hand-tool consistency for hand application, spotting fasteners and finishing metal trim; machine-tool consistency for mechanical embedding and finishing.

See Chapter 1 for detailed description of products, sizes and type available; Chapter 6 for application tools.

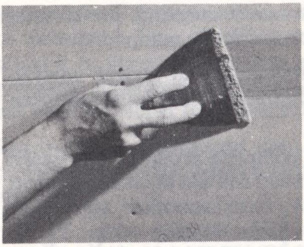
hand tool application

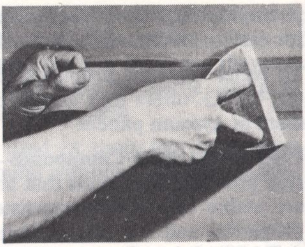




Pre-filling Joints. Pre-fill the "V" groove between SHEETROCK SW Gypsum Panels (diagram, above) with DURABOND 90 Joint Compound. Apply compound directly over "V" groove with a flexible 5″ or 6″ joint finishing knife. Wipe off excess compound that is applied beyond the groove. Allow pre-fill compound to harden. When proceeding with PERF-A-TAPE Joint Compounds, this pre-fill compound must be dry.

Buttering Joints. Check all nails by drawing finishing knife across fasteners. Drive home protruding fasteners in panels, leaving a dimple in surface paper. Using a broad steel finishing

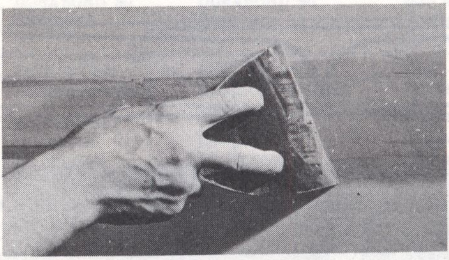




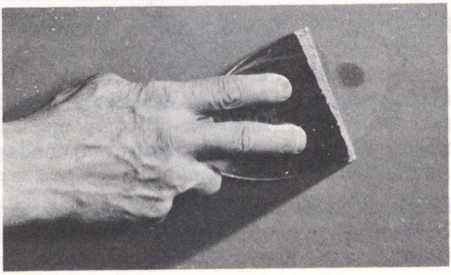
knife, butter joint compound into channel formed by tapered edges of SHEETROCK, filling channel fully and evenly (above, left). Avoid heavy fills which increase the possibility of excessive shrinkage and check cracking.

Embedding Tape. Center PERF-A-TAPE reinforcement and press it down into fresh joint compound. Holding knife at an approximately 45° angle to board, draw knife along joint with sufficient pressure to remove excess compound (above, right). Leave sufficient compound under tape for proper bond but not over 1⁄32″ under feathered edge. Do not use topping or finishing compound for embedding tape.

Covering Tape. When tape is embedded, apply a skim coat of joint compound immediately after embedding (shown below). This skim coat reduces the possibility of edge wrinkling or curling which may lead to edge cracking. Allow to dry completely. (See "Drying Time Guide," found later in this chapter.)

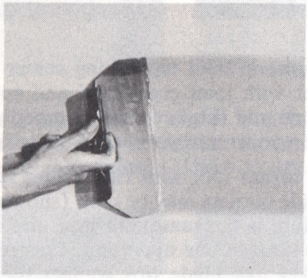


Spotting Fastener Heads. Apply first coat of joint compound over all fastener heads (shown below) immediately prior to or after embedding tape.

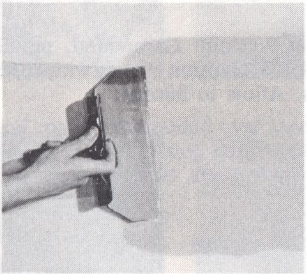


Use enough pressure on knife to finish compound level with wall surface. Spot fastener heads in a similar manner during second coat application of compound. During application of third coat over joints, sand fastener heads lightly and apply third finishing coat over fastener heads. DURITE SCREEN-BAK sanding cloth, 320 or 220 grit, is recommended for best results. Allow compound over fastener heads to completely dry. Light sanding may be necessary before decoration.

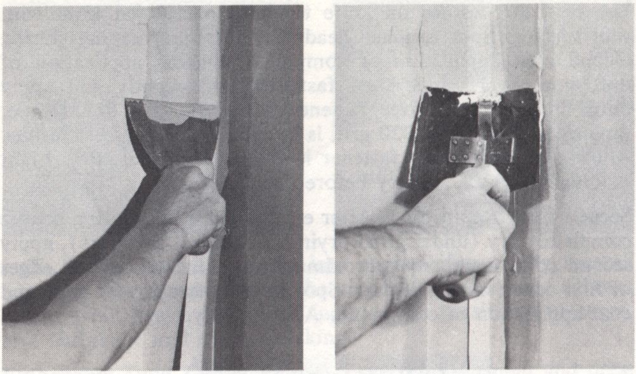
Second Coat Application. After embedding and covering coat is completely dry (under good drying conditions, 24 hours), apply second coat, feathered approximately two inches beyond edges of first coat (shown below). Spot fastener heads with a second coat application of compound. Allow to dry.



Third Coat Application. After second coat is dry, sand lightly. Apply a thin "finishing" coat to joints and fastener heads (below). Feather joint edges at least two inches beyond second coat. Sand lightly when dry.



End Joints. Butt or end joints are treated the same as tapered joints. When SHEETROCK Gypsum Panels are applied, end joints should be loosely butted together. Fill joint with compound to a point slightly above surface of panels to allow for shrinkage in drying. Apply additional compound along each side of joint and embed tape as described for tapered joints. Apply covering, second, and third coats in same manner as for tapered joints. Finishing coats of joint compound must be feathered wider (approximately 18"), because there is no taper in which to embed tape.

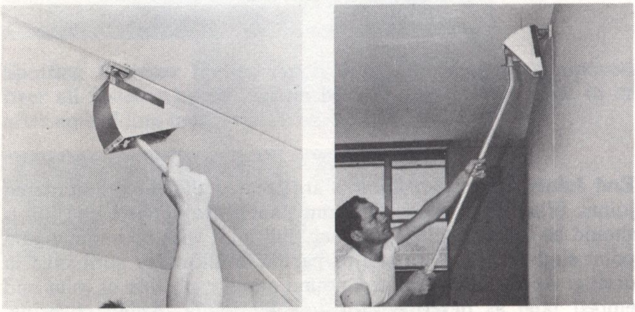


Finishing Inside Corners. Fold tape along center crease. Butter both sides of corner with joint compound and apply tape (left, above). Apply second and third coats of compound (one side at a time) in the same manner that you would use to finish flat joints.

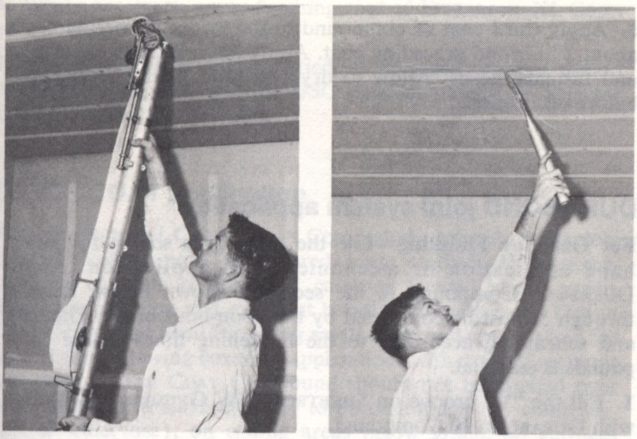
The Perf-A-Tape corner tool with two blades specially angled to work the 90° inside corners may be used (shown, right above). Application procedure is the same, but tape and compound can be applied on both sides in one operation. Corner tool is angled slightly so about 1½″ of blade tips contact the corner. After embedding tape, remove excess compound with tip of either blade. Final finishing is done with long continuous strokes.

mechanical tool application

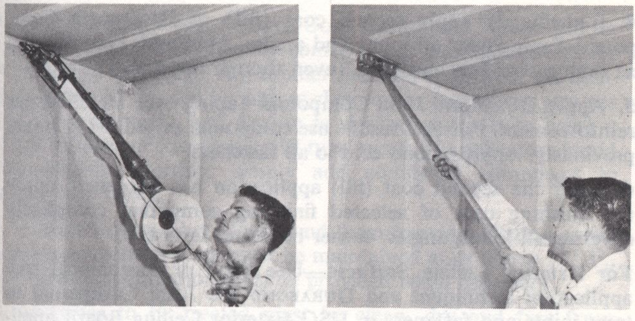
1. Using Durabond 90 Joint Compound, pre-fill "V" groove between Sheetrock SW Gypsum Panels with special adapter for Ames tool (below). Allow to harden.



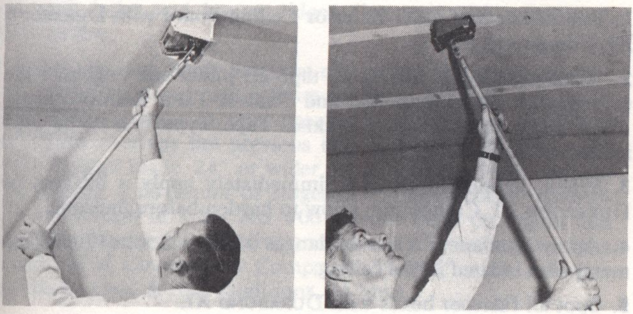
2. Using compound of suitable consistency, mechanically tape all joints (page 129, top). Touch up with broad knife (opposite, top right). Allow to dry.



3. Mechanically tape interior angles. Finish both sides of angles with corner roller and corner finisher as shown below. Touch up with broad knife as necessary. Allow to dry.



4. Apply second coat of compound over tape on flat joints using hand finisher tool (below). Using compound of thicker consistency, spot fastener heads and apply first coat to metal trim. Allow to dry.



5. Apply third coat of compound to flat joints feathering edges about 2″ beyond preceding coat. Apply finish coat to metal trim and fastener heads. Allow to dry and sand lightly as required before decoration.

DURABOND joint system application

For One-Day Finishing—Use the techniques shown for either hand application or mechanical tool application. Apply DURABOND Compound in the sequence shown below. Steps 1 through 5 must be completed by the noon-hour break. Planning and scheduling according to the hardening times of the compounds is essential.

1. Fill the "V" groove on SHEETROCK SW Gypsum Panel joints with DURABOND 90 Compound.

2. Spot fastener heads throughout the entire job using DURABOND 90 Compound.

3. After the compound in the "V" groove has hardened, tape all joints and angles with DURABOND Compound-Taping.

4. Immediately apply second coat (fill) of DURABOND Compound-Taping over all joints and angles. Apply this coat as soon as taping coat has hardened (even though not dry).

5. Apply DURABOND Joint Compound-Taping over metal corner reinforcement. For best results use compound mixed 1-1½ hours previously. Apply second coat to all fasteners.

6. After the second coat (fill) application has hardened, apply the finishing coat of selected finishing compound completely covering all joints, angles, corner bead and fasteners.

For Exterior Ceiling Surfaces—Use hand or mechanical tool application techniques and DURABOND XL Joint Compound to treat joints and fasteners in USG Exterior Ceiling Board applications. During periods of near-freezing temperatures, check weather forecast before beginning work. Minimum air, water, mix and surface temperatures of 45°F. must be assured until DURABOND XL is completely dry. Apply DURABOND XL Joint Compound in the following sequence:

1. Pre-fill joints of USG Exterior Ceiling Board with DURABOND XL Compound.

2. After pre-fill has hardened, tape all joints and angles in the ceiling with DURABOND XL and PERF-A-TAPE Reinforcement. (With hand application, IMPERIAL Tape Type P may be used instead of PERF-A-TAPE).

3. When compound hardens, immediately apply a fill coat of DURABOND XL Compound; allow to harden before finishing.

4. Apply DURABOND XL over flanges of USG Control Joints and metal trim located in the ceiling.

5. Spot all fastener heads with DURABOND XL.

6. Where necessary, apply finishing coat of DURABOND XL Compound over hardened fill coat.

7. When DURABOND XL has dried, all exposed surfaces should be painted with two coats of USG exterior paint (see Selector Guide, Chapter 1).

COVER COAT application

With ready-mixed COVER COAT Compound, drywall contractors are able to offer smooth or textured, white, ready-to-decorate surfaces on concrete ceilings and columns located above grade. Smooth application and excellent bonding strength make COVER COAT Compound ideal for filling small holes and crevices and for second and following covering applications with drywall methods and tools. COVER COAT Compound should not be applied over moist surfaces or surfaces likely to become moist (by condensation or otherwise), on ceiling areas below grade, on surfaces which project outside the building, or on other areas which might be subject to moisture, freezing, efflorescence, pitting or popping, movement, or other abnormal condition.

application

1. For best results apply COVER COAT Compound before interior partitions are erected. Use the compound at package consistency to minimize shrinkage. If a thinner material is desired, the compound may be thinned by adding clean water (up to one pint per 5 gals. compound) and mixing to desired consistency using a potato masher or low-speed drill type mixer. If applicator should inadvertently overthin, simply add additional compound to thicken and remix.

2. Protect COVER COAT Compound from freezing. During entire application, temperature must be maintained at or above 55° F., and heat and ventilation must be provided when necessary.

3. All areas to be treated must be clean, dry and free from contaminants and all exposed metal protected with a rust preventative paint. Large projections should be chiseled off and brought flush with the concrete surface.

4. Apply COVER COAT Compound over joints and ridges left by concrete forms with a flat finisher or knife. Fill in and/or level out small holes and lumps, ridges, lips, etc. with compound. Allow to dry.

5. Using two men, apply first coat of compound to entire surface area of ceiling, beam, or column with flat finisher or regular knife. Keep moving in one direction, making sure that each application overlaps the previous one. Follow application with a pole drywall blade, 24″ or wider, to smooth out fresh application, leaving a minimum of ridges and imperfections. Coordinate application of USG No. 900 Corner Bead on angles and corners as required, embedding and covering both flanges with a smooth fill of COVER COAT Compound 3″ to 4″ wide. Allow to dry (under good drying conditions, 24 hrs.).

6. Second coat application—sand and dust first coat. Apply second coat in same manner described above or texture at this point if desired. Allow to dry. Sand to ultimate smoothness with fine sandpaper, if necessary. For texturing second coat, simply add water and/or sand. Use very fluid mix for fine texture, less fluid for coarse effects.

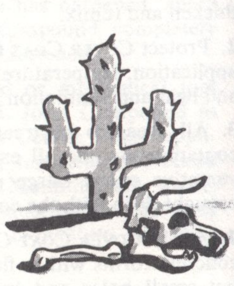
7. A very rough or uneven concrete surface may require three or more coats applied in the same manner.

8. Cover Coat Compound should be dry and dust-free if further decorating is desired. Seal with a good quality sealer (Sheetrock Sealer or Texolite Primer-Sealer is recommended) before finish decoration is applied.

9. More detailed directions and special uses information are available on request. Ask for U.S.G. Folder J-59.

weather tips on taping and finishing

Weather—hot, wet or cold—affects performance and working qualities of joint treatment compounds. Each type of weather produces unique reactions within compounds. Hot, dry weather hastens drying, accelerates aging. Wet weather slows drying and may trap the unwary, who rely on appearance to judge joint dryness. Cold weather slows mixing, brings with it the hazard of freezing. Any of these reactions can result in costly and serious problems unless preventive measures are taken. Is prevention difficult? Not at all—it amounts to nothing more than the good-sense practices that conscientious applicators follow every day. For example:



When weather is hot and dry . . .

DO—close doors and windows to eliminate drafts. Then raise humidity by generously sprinkling subfloors with water or by placing open cans of water about the job.

DO—work shorter joint lengths in order to finish each section before the compound becomes unworkably dry.

DO—keep inner walls of buckets and other containers, above the compound level, wiped clean to prevent crusting. Dislodged pieces of crusted compound will contaminate the fresh mix.

DO—use Durabond Joint Compound-Taping or, better still, Durabond 90 Joint Compound when accelerated drying is difficult to prevent. The shorter hardening time of DURABOND 90 minimizes the effect of too-fast drying conditions.

DO—use DURABOND embedding compounds or USG Ready Mixed Compound-All Purpose. All have high resistance to edge cracking caused by hot, dry weather.

DO—use USG Ready-Mixed Compounds if the harder finish of powdered compounds make hot weather sanding difficult.

DO—rotate stocks of both powdered and ready-mixed compounds. First-in, first-out stock rotation avoids problems caused if hot weather accelerates aging.

DON'T—add excess water to compounds to extend their working time. The practice increases shrinkage.

DON'T—allow extremely rapid air movements over wet joints —especially if a thin-consistency mix is applied. This combination is a major cause of check and edge cracking.

DON'T—use casein compounds mixed long before needed if their odor suggests spoilage. The odor will persist even after the joint is dry and is certain to provoke complaints.

DON'T—allow bags of powdered compounds to lie exposed to full sunlight for extended periods. Such exposure may be harmful, particularly to topping compounds.

DON'T—be misled to believe that the superior packaging of USG ready-mixed compounds will substitute for proper weather protection. Finest performance is assured by providing covered storage for these materials.

When weather is wet and humid . . .

DO—allow each coat of compound to dry thoroughly before applying subsequent coats.

DON'T—rely on visual inspection to check joint dryness—refer to chart on page 138 for specific drying rates.

DO—choose DURABOND Joint Compound-Taping or DURABOND 90—especially during cold, wet weather. Their rates of hardening are virtually unchanged by high or variable humidity.

DON'T—store tape and powder compounds in damp areas. Working qualities of both are seriously affected by dampness. Tape has an affinity for moisture, and damp tape is a major cause of center humping and edge wrinkling.

When winter winds blow . . .

DO—allow extra soaking time (after mixing) for casein-based joint compounds. Their binders dissolve slowly. Most casein-based compounds must stand at least 30 min., even in warm weather. When their mixed temperature is between 55° and 60°F., binders need at least 30 to 45 minutes soak to completely break down—up to 1½ hours if temperature is between 40° and 45°F. Look for the warning signals. Undissolved compounds work heavy and dry, tend to curl up behind the knife; often have a "salt and pepper" appearance after application.

DO—provide heat. Maintain a minimum 55°F. throughout gypsum panel erection, taping, finishing and until final decoration dries. Avoid temperature fluctuations of more than 15°. Use central heating plants whenever possible—unvented temporary heaters may produce staining fumes.

DO—raise temperature of powdered compounds to 70°F. just prior to mixing, and use warm water for finest results.

DO—provide ventilation by opening some windows slightly. Uneven drying can cause bond failure and delayed shrinkage.

DO—mix compounds (except Durabond compounds) the night before using for best results.

DO—plan work to allow sufficient drying time between coats and before decorating begins. Under adverse weather conditions, more than 48 hrs. drying time may be needed between coats. Finishing over base coats whose surfaces appear dry, but are wet underneath, is the principal cause of delayed shrinkage and joint discoloration.

DO—protect USG Ready-Mixed Joint Compounds from freezing. If it occurs, thaw at room temperature; never force thawing.

DO—use Durabond Joint Compounds for an extra margin of safety if minimum 55° temperature cannot be maintained after application. These quick-hardening formulations work well under conditions which cause conventional compounds to fail.

DON'T—allow any compound to freeze on the wall. Bond strength is lost after freezing and compound must be replaced.

DON'T—add water just to speed mixing. Excess water causes "sloughing off" as the mix stands in the pail.

When finishing exterior ceiling joints . . .

DO—insist that USG Exterior Gypsum Ceiling Board be used. Its special core and face paper resist sagging. And, the eased edges contribute to stronger, smoother, more ridge-free joints.

DO—pre-fill joints of USG Exterior Ceiling Board with DURABOND XL Compound—the compound specifically formulated for exterior use.

DO—mix DURABOND XL Compound with drill-powered mixer.

DO—reinforce joints with PERF-A-TAPE Reinforcing Tape.

DO—use DURABOND XL for fill and finish coats—for filling and finishing exterior metal corners and spotting nail heads.

DON'T—hand-mix DURABOND XL Compound.

DON'T—mix more DURABOND XL Compound than can be used within 30 minutes.

DON'T—use DURABOND XL unless weather forecasts promise temperatures above 45°F. until compound is thoroughly dry.

DON'T—apply DURABOND XL if high wind and impending rain threaten to wet compound before it hardens.

How to get best results, inside and out, in all weather . . .

DO—mix casein-based compounds to a heavy consistency. Add necessary additional water *after* soaking for required consistency.

DO—add powdered compounds to water when mixing—*not* water to powder. And sift compounds while pouring.

DO—apply compounds of heavy consistency over fastener heads.

DO—keep tools and mixing containers clean at all times. Always use clean water for mixing.

DO—apply three coats for finest results.

DO—apply relatively thin coats in corners to prevent cracking.

DO—minimize fill coat craters by applying the finish coat with firm pressure and with tool held at 45°.

DO—fill open joints (¼″ or wider) and allow to dry (conventional compounds) or harden (DURABOND compounds) before proceeding with regular joint finishing operations.

DO—exercise special care when using DURABOND Joint Compounds for mechanical application. Tool cleanup and careful work scheduling are especially important.

DO—choose DURABOND Compounds when time is short and schedules are critical.

DO—use joint treatment compounds manufactured by United States Gypsum when material cost is a major factor yet high quality standards must be maintained.

DO—*choose DURABOND 90 and SHEETROCK SW Gypsum Panels for the strongest* **interior** *joints, finest walls and ceilings.*

DO—*choose DURABOND XL with USG Exterior Gypsum Ceiling Board for the strongest and smoothest* **exterior** *ceilings.*

DON'T—use conventional drying compounds to treat USG Exterior Gypsum Ceiling Board joints.

DON'T—build high crowns over joints. This practice produces shadow areas, encourages ridging.

DON'T—combine casein-based compounds with *any* non-casein-based compound.

DON'T—expect "all-purpose" type compounds to have all superior characteristics of compounds designed for specific purposes.

DON'T—combine powdered and ready-mixed compounds.

DON'T—use drill-type mixers with speeds higher than 600 RPM. Excessive mixing speeds whip air into compounds and accelerate hardening action of DURABOND Compounds.

DON'T—apply excess knife pressure when spotting nailheads. This practice scoops compound out of the dimpled area surrounding the fastener.

DON'T—allow painters to begin work before joints are thoroughly dry. Painting over wet joints causes joint discoloration.

DON'T—overthin compounds with water. Excess water doesn't speed mixing—can cause delayed shrinkage and bond failures. Exception to the rule—DURABOND Joint Compound tolerates excess water since it does not materially affect hardening rates.

DON'T—allow DURABOND Joint Compounds to become contaminated with other compounds.

DON'T—*hesitate to contact your U.S.G. Representative* for more information about the most versatile family of joint treatment compounds in the industry:

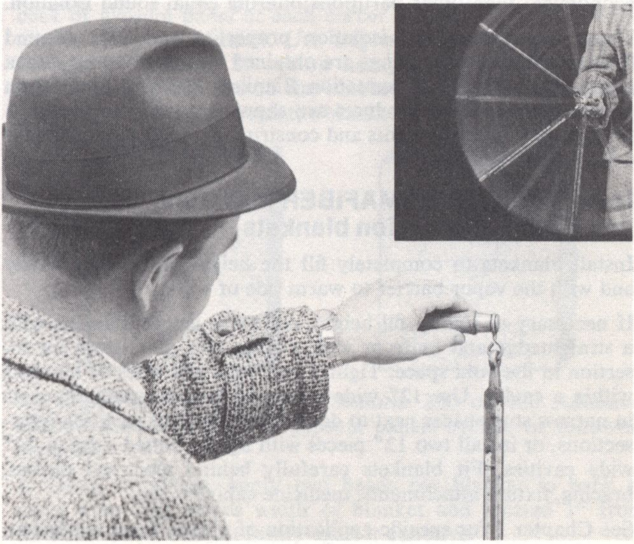
- USG Brand Joint Compounds in the crisp white bags, for those who demand the finest—formulations that mix faster and more easily, apply smoother.
- Perf-A-Tape Joint Compounds in the rich brown bags, choice of exacting professionals for years.
- Durabond Joint Compounds in the light tan bags, for special or regular applications where extreme strength, hardness, speed and minimum shrinkage are desired.
- USG Ready-Mixed Compounds—pre-mixed, factory-controlled quality and ready to use when you open their containers.

drying time guide

This guide provides a means for estimating drying requirements for drywall joint compound under various temperatures and humidity conditions. To figure drying time, determining the temperature and humidity with a sling psychrometer (see photo), then apply these figures to the chart on next page.

The drying times shown are for joint compound under tape, for evaporation of 10 lbs. water per 250 ft. of tape, corresponding to 1/16" to 5/64" wet compound thickness under the tape. The drying times for thicker (or thinner) coats of wet compound between the tape and board will be increased (or decreased) approximately in proportion to the wet compound thickness.

These drying times apply when the exposed surface of the tape is bare or nearly bare. A heavy compound coat over tape lengthens drying time.



Guide to Drying Time—Joint Treatment

Relative Humidity	Temperature 50°	60°	70°	80°	90°	100°
10%	21H	14H	10H	7H	5H	3½H
20%	23H	16H	11H	8H	5½H	4H
30%	26H	18H	12H	9H	6H	4½H
40%	29H	20H	14H	10H	7H	5H
50%	36H	24H	17H	12H	9H	6H
60%	42H	29H	20H	14H	10H	8H
70%	2¼D	38H	26H	19H	14H	10H
80%	3¼D	2¼D	38H	27H	19H	14H
85%	4D	3D	48H	34H	25H	18H
90%	6D	4¼D	3D	49H	36H	26H
91%	7D	4¾D	3¼D	2¼D	40H	29H
92%	8D	5D	3½D	2½D	44H	32H
93%	9D	6D	4D	2¾D	48H	36H
94%	10D	7D	5D	3¼D	2¼D	41H
95%	12D	8D	6D	4D	2¾D	48H
96%	14D	10D	7D	5D	3½D	2½D
97%	18D	12D	9D	6D	4½D	3¼D
98%	26D	18D	12D	9D	6D	4½D

D=Days (24 hrs.) H=Hours

special applications

insulating wool application

Many U.S.G. Drywall Partitions have been developed to meet the demand for increased privacy between units in residential and commercial construction. Designed for wood stud, metal stud or laminated gypsum board construction, these assemblies offer highly efficient sound control properties, yet are more economical than other partitions offering equal sound isolation.

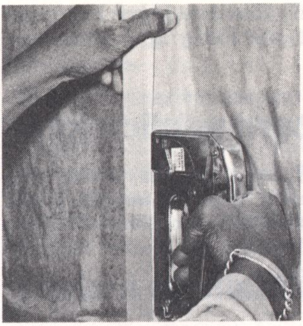
These improved sound isolation properties and STC (Sound Transmission Class) ratings are obtained by using THERMAFIBER Insulating or Sound Attenuation Blankets. General application procedures for these products are shown below. See Chapter 3 for the specific components and construction details and Chapter 4 for sound ratings.

installation—THERMAFIBER insulating and sound attenuation blankets

Install blankets to completely fill the height of the stud cavity and with the vapor barrier to warm side of wall.

If necessary to tightly fill height, cut stock length blankets with a straightedge and knife or with a large pair of scissors for insertion in the void space. Tightly butt ends and sides of blankets within a cavity. Use 12″ wide pieces of THERMAFIBER Blankets in narrow stud spaces next to door openings or at partition intersections, or install two 12″ pieces with tightly butted sides in 24″ wide cavities. Fit blankets carefully behind electrical outlets, bracing, fixture attachments, medicine cabinets, etc.

See Chapter 3 for specific application of plastic foam insulation.



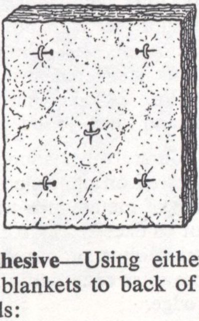
attachment—insulating blankets

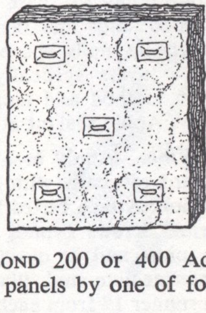
To Wood Studs—Using a power-driven or hand stapling gun, attach paper flanges to sides of studs (left, above) and at plates with staples having a 9⁄16″ leg and spaced 6″ to 8″ o.c. Attaching blankets to face of stud generally causes gypsum panels to deform at the joint and makes joint treatment difficult. Face of studs should be smooth and level for panel attachment (right, above).

To Gypsum Panels—In metal stud and laminated gypsum panel partitions, attach blanket to back side of board using staples applied with pistol type hand stapler. For 1½″ and 2″ thick blankets use staples with a 9⁄16″ leg, for 3″ thick blankets use staples with a ⅞″ leg. Place staples at least 2″ in from edges, at each corner and along vertical edges spaced not to exceed 24″ o.c.

attachment—sound attenuation blankets

By Stapling—Using a pistol type hand stapler, attach blanket to back of gypsum panel at each corner at least 2″ in from edges and in center of blanket. Use staples with a 9⁄16″ leg applied through a minimum 2″ square heavy paper washer or staple over a 6d nail laid flat on the blanket. Either method prevents staple from pulling through the blanket.





By Adhesive—Using either Durabond 200 or 400 Adhesive, attach blankets to back of gypsum panels by one of following methods:

1. Using cartridges, apply two beads per blanket to back of panel extending across width of blanket and located 1″ from each end. Press blanket firmly against adhesive.

2. Using bulk adhesive, apply evenly distributed spots over panel area covered by blanket. Press blanket firmly against adhesive.

sound deadening board application

Several U.S.G. Drywall Partition Systems effectively utilize wood fiber or mineral fiber sound deadening boards to improve sound isolation properties. General application procedures for these products are shown below. See Chapter 3 for specific construction and Chapter 4 for sound ratings.

installation

Wood Fiber—Apply base layer sound deadening board vertically with joints staggered on opposite sides of the partition. Attach to each side of staggered 2″x3″ wood studs with 6d cement coated gypsum panel nails. Space nails 12″ o.c. along the vertical edges and 30″ o.c. along the intermediate framing.

Apply the ⅝″ SHEETROCK FIRECODE Gypsum Panel face layer horizontally. Fasten face layer with 7d cement coated nails spaced 7″ o.c. and staggered from wood fiber sound deadening board nails. Finish joints with a U.S.G. joint system.

The above describes fastener spacing and application of wood fiber sound deadening board in 1-hr. fire-rated partition construction using staggered studs (UL Des U308, was 17-1 hr) having STC Median 55.

For partition construction used in IBI-20-FT rated at 50 STC, apply ½″ base layer wood fiber board vertically to 2x4 wood studs with joints staggered on opposite sides. Fasten board around the perimeter and to intermediate framing with 5d cement coated gypsum panel nails spaced 12″ o.c. Position ⅝″ SHEETROCK FIRECODE Panel face layer vertically with joints offset 16″ from the base layer and apply, using adhesive strip lamination method. Apply sealant at perimeter and finish joints.

For partition construction used in IBI-5-FT rated at STC Median 40, apply ½″ base layer wood fiber board horizontally to 2x4 wood studs and fasten to all supports with 5d cement coated gypsum nails spaced 12″ o.c. Apply ½″ SHEETROCK Panel face layers vertically with joints staggered using strip lamination method and temporary nailing 24″ o.c. until adhesive is dry. Apply sealant at perimeter and finish joints.

Mineral Fiber—Apply base layer of mineral fiber sound deadening board vertically with joints staggered on opposite sides of the partition. Attach board to each side of metal studs with ⅞″ USG Brand Screws Type S spaced not to exceed 27″ o.c. along vertical joints and at quarter and mid-points of panel height along intermediate stud. Place two screws at each end of board through runner 1″ from each vertical edge.

Apply ½″ SHEETROCK FIRECODE "C" Gypsum Panel face layer vertically with joints staggered from base layer joints. Apply face layer adhesively using PERF-A-TAPE Joint Compound-Taping and sheet lamination method. Fasten panels around the perimeter with 1⁵⁄₁₆″ USG Brand Screws Type S spaced 12″ o.c. Finish joints.

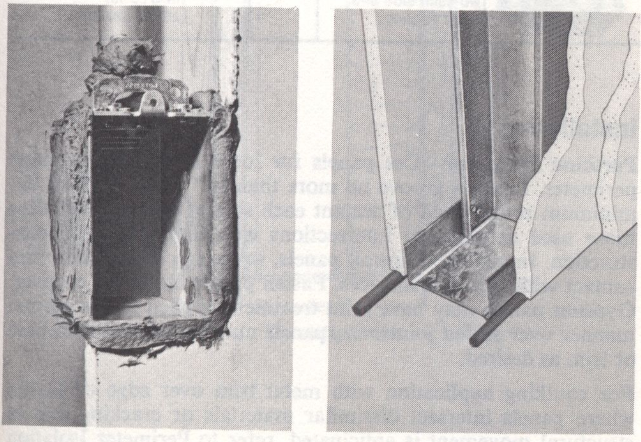
The above describes fastener spacing and application of mineral fiber sound deadening board in 1-hr. fire-rated partition construction (UL Des U407, was 23-1 hr) rated at 48 STC. A similar construction with ⅝″ SHEETROCK FIRECODE face layers, screw spacing 16″ o.c., and 3⅝″ USG Metal Studs has STC Median 50 and an estimated 2-hr. fire rating.

sealant application (caulking)

Where a drywall partition is used as a sound barrier, USG Acoustical Sealant should be used to seal all cut-outs and all intersections with the adjoining structure. The sound that will leak through a one-inch opening will offset the entire sound transmission loss value of a partition. Caulking at the runners and sealing the perimeter of the gypsum panels are required to achieve sound transmission loss values on the job that approximate those determined by test. Caulking has proven to be the least expensive way to effectively seal the wall to prevent sound leaks. All references herein to "caulk" or "caulking" indicate use of USG Acoustical Sealant.

Early sound tests suggested that as many as six beads of perimeter caulking were needed for maximum sound control performance. Those tests measured sound leakage around a partition panel whose perimeter was shimmed ⅛″ away from the test chamber walls.

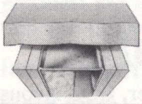
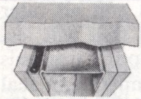
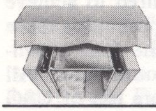
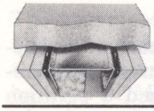
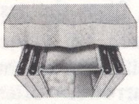
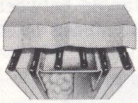
Now, U.S.G. Research tests demonstrate that reliability of the perimeter seal is increased if the relief is much narrower—often a gap no wider than is formed in a conventional angle between two gypsum panels. When such a gap, around the base layer



Proper caulking of outlet box (left), and double-layer partition.

perimeter, is caulked with a ¼″ bead of sealant, installation of face panels compresses the sealant into firm contact with all adjacent surfaces to form a permanent airtight seal.

The assemblies tested consisted of 2½″ USG Metal Studs 24″ o.c., double-layer ½″ SHEETROCK SW Gypsum Panels each side; 1½″ THERMAFIBER Sound Attenuation Blankets between studs. Results of six sealant conditions are shown below:

	Sealant Location	Tested STC	Comments
	Unsealed	29	Leakage dropped STC from 53 to 29.
	Single bead of sealant at base	49	Partial sealing improves STC.
	Both base layers sealed	53	Complete sealing returns STC to 53.
	Sealant applied between runner and base layers	53	Alternate method for sealing returns STC to 53.
	Base and face layers sealed	53	No improvement in STC for added sealant.
	Six rows of sealant, two each side and under runner	53	No improvement in STC for added sealant.

installation

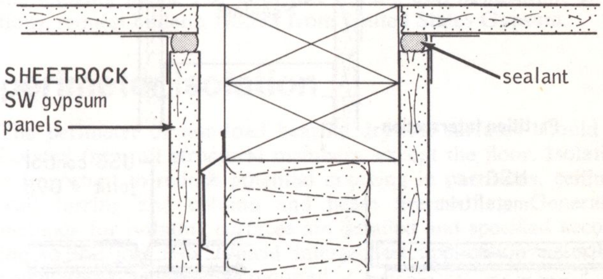
Partition Perimeter—Cut panels for loose fit around partition perimeter. Leave a groove no more than ⅛″ wide. Apply a ¼″ minimum round bead of sealant each side of runners including those used at partition intersections with dissimilar wall construction. Immediately install panels, squeezing sealant into firm contact with adjacent surfaces. Fasten panels in normal manner. Gypsum panels may have joint treatment applied in the normal manner over sealed joints. Or, panels may be finished with base or trim as desired.

For caulking application with metal trim over edge of panels where panels intersect dissimilar materials or cracking due to structural movement is anticipated, refer to Perimeter Isolation described later in this chapter.

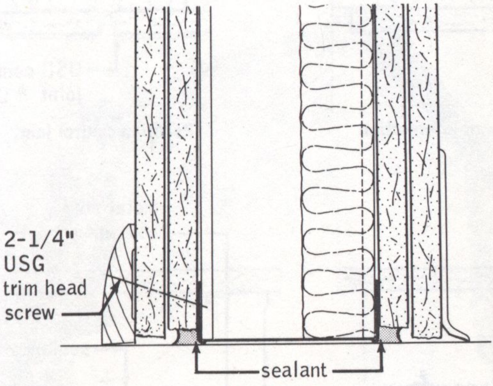
Control Joints—Apply sealant beneath control joint application to reduce flanking path for sound through control joint.

Partition Intersections—Seal face layer of partitions intersecting sound-isolating partitions that are extended to reduce sound flanking paths.

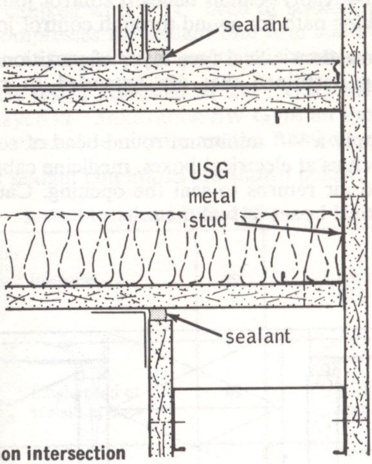
Openings—Apply a ¼″ minimum round bead of sealant around all cut-outs such as at electrical boxes, medicine cabinets, heating ducts and cold air returns to seal the opening. Caulk sides and backs of electrical boxes to seal them.



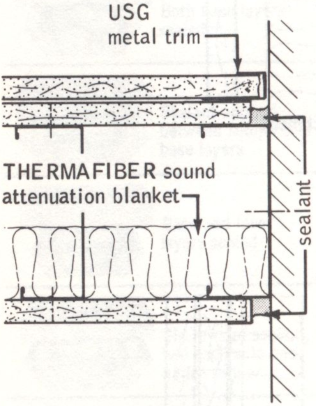
Ceiling attachment



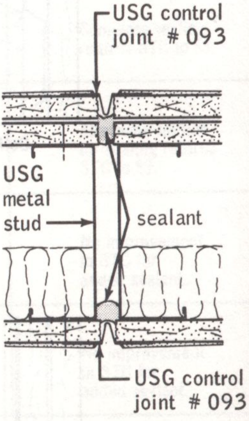
Floor attachment



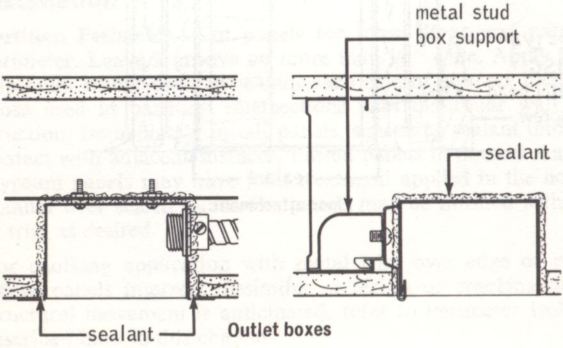
Partition intersection



Partition wall intersection



Partition control joint



Outlet boxes

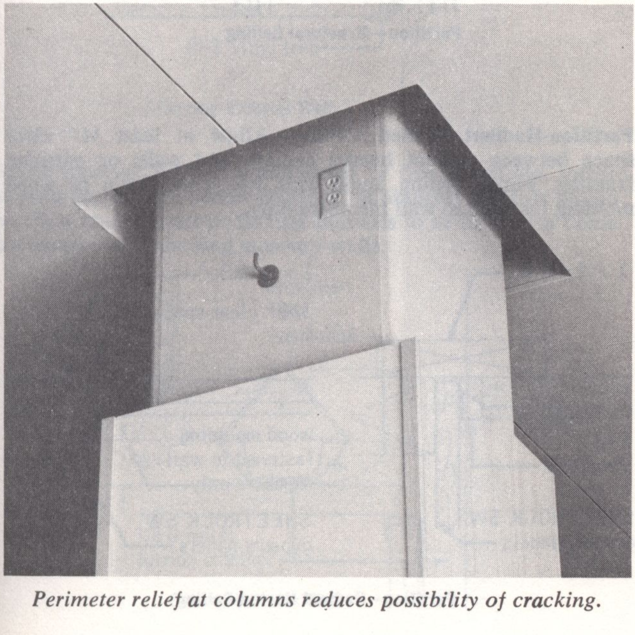
MASTICAL underlayment compound

MASTICAL Underlayment Compound provides floor/ceilings that effectively resist transmission of airborne and impact sound. MASTICAL is poured into place over plywood or T&G wood subbase and troweled smooth. It hardens quickly with minimal shrinkage to produce a durable, crack-free surface ideal for any type of floor covering. MASTICAL Compound is the *only* incombustible cementitious underlayment with a 1-hour U.L. fire-resistance rating for wood frame floor/ceilings. In addition MASTICAL offers reduced floor weight and rapid construction; improves performance of sound-resisting partitions—by 5 or more STC points—by sealing the floor intersection and reducing the flanking paths. For complete mixing and application directions, request bulletin IR-535 from United States Gypsum.

perimeter isolation

The perimeter of non-load bearing drywall surfaces should be isolated from all structural members, except the floor. Isolation is important to reduce potential cracking in partitions, ceilings, wall furring and column and beam fireproofing. Generally, methods for isolating surfaces are detailed and specified according to the job. The typical intersection application described below may be adapted as required.

Gypsum Panel Edge Treatment—Where panels intersect dissimilar materials, appropriate metal edge trim may be applied

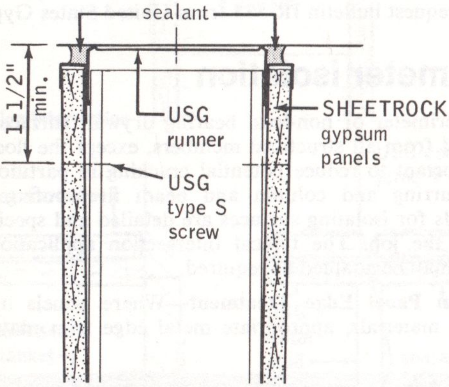


Perimeter relief at columns reduces possibility of cracking.

to the face layer perimeter and sealant applied to close the gap. P-1 Vinyl Trim may be used without sealant or joint treatment.

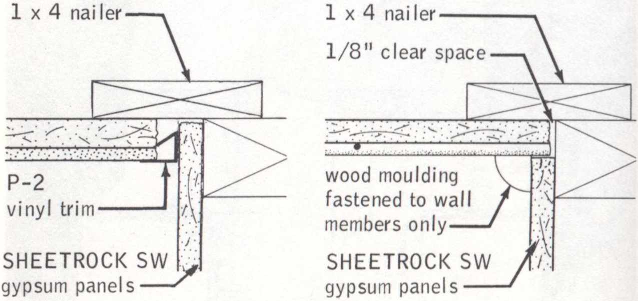
Where edge trim is not desired, caulked intersections of SHEETROCK Gypsum Panels may have joint treatment applied in the normal manner over caulking. However, joints are likely to crack under the structural movement. Cracking may be minimized by slitting in the angle or flat taping.

Partition-Structural Ceiling—Attach metal runner to structural ceiling to position partition. Cut metal stud ⅜″ less than floor-to-ceiling-height. Attach gypsum panel to stud at least 1½″ down from ceiling. Allow ⅜″ minimum clearance atop gypsum panels; finish as required.



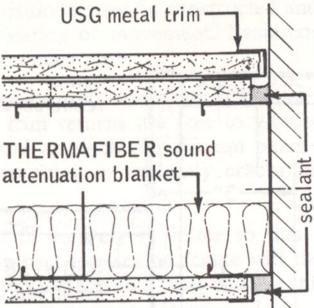
Partition—Structural Ceiling

Partition-Radiant Heated Ceiling—Allow at least ⅛″ clear space between radiant heated ceilings and walls or partition framing. Finish ceiling angle with P-2 Vinyl Trim or wood molding fastened to wall members only.


1 x 4 nailer
P-2 vinyl trim
SHEETROCK SW gypsum panels
1 x 4 nailer
1/8" clear space
wood moulding fastened to wall members only
SHEETROCK SW gypsum panels

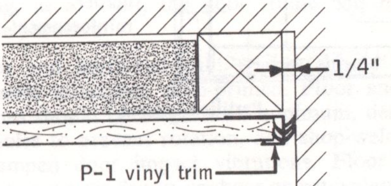
Partition—Radiant Heated Ceiling

Partition-Exterior Wall—Attach metal stud to exterior wall to position partition. Attach panels only to second metal stud erected vertically no more than 6″ from wall. Allow at least ⅜″ clearance between partition panel and wall. Caulk as required.



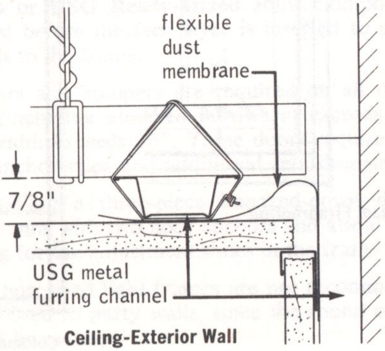
Partition-Exterior Wall

Furring-Exterior Wall—Allow ¼″ minimum clearance between gypsum panel trim and intersecting exterior wall or column. Apply sealant as required.



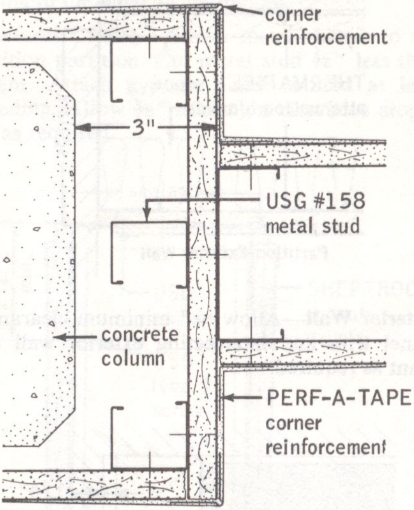
Furring-Exterior Wall

Ceiling-Exterior Wall—On suspended or furred ceilings, locate supports for gypsum panels within 6″ of abutting surfaces but do not allow main runner or furring channels to be let into or come into contact with abutting masonry walls.



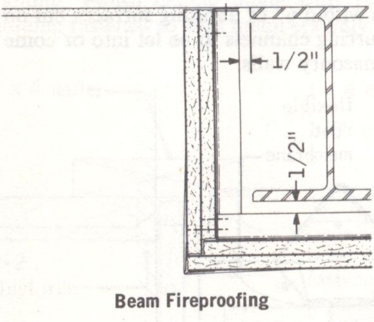
Ceiling-Exterior Wall

Partition-Column—Fur gypsum panels away from concrete column using vertical metal studs. Attach stud in intersecting partition to stud within free-standing furring.

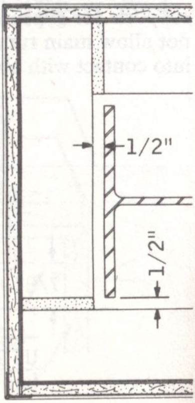


Partition-Column

Beam and Column Fireproofing—Allow ½″ minimum clearance between steel beam flanges and drywall fireproofing construction.



Beam Fireproofing



Column Fireproofing

door frame and window installation

Metal door and borrowed light frames used with SHEETROCK Gypsum Panel partitions must be constructed and installed properly to prevent twisting or movement. Basic considerations for satisfactory performance are:

1. Frames must be securely anchored. If frames are free to twist upon impact, or trim returns are free to vibrate, movement of the frame will tend to pinch the gypsum panel face paper and crush the core, resulting in unsightly cracks in the finish and loose frames.

2. Partition must fit securely in frame so that wall and frame work as a unit. Impact stresses on frame will then be dissipated over entire partition surface and local damage minimized.

3. The frame must have a throat opening between trim returns that accurately fits the overall thickness of the partition. The face layer panels should be enclosed by the trim and not butted against the trim return. This throat opening measurement is critical, as too large a tolerance between panels and trim return will cause door frame to twist and vibrate against the panels. Too small a tolerance will prevent the panels from fully entering frame opening; as a result, the door frame will not be held securely by the partition.

4. Metal door and borrowed light frames should be formed from 18-ga. steel minimum, shop-primed. Floor anchor plates for door frames should be 14-ga. steel minimum, designed with two anchor holes to prevent rotation, and shop-welded to trim flanges to dampen door impact vibrations. Floor anchorage should be by two power-driven anchors or equivalent per plate. Jamb anchor clips should be formed of 18-ga. steel minimum, welded in the jamb and head, and screw-attached to the stud. A minimum of four anchor clips per jamb is recommended with the top clip located near the frame head (see details below).

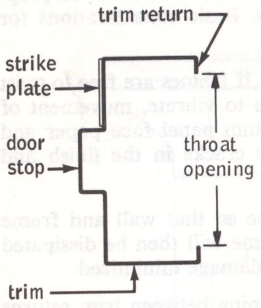
5. To provide maximum rigidity of metal door frames, spot-grouting at the jamb-anchor clips is recommended after the stud is installed but before the gypsum panels are erected. A grouting of DURABOND or USG Ready-Mixed Joint Compound should be applied just before the face layer is inserted to securely adhere the panels to the frame.

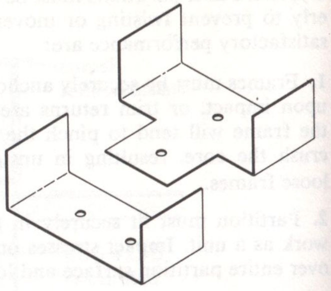
6. Door closers and bumpers are required on all doors where door weight (including attached hardware) exceeds 50 lbs., or where door width exceeds 36″. These doors require spot-grouting at jamb anchor clips and additional reinforcement at jamb.

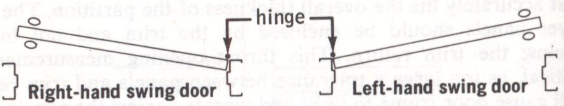
7. When installing a three-piece knocked-down door frame, secure runner ends with two floor anchors and allow space in the rough framing for the adjustment shoes in the frame.

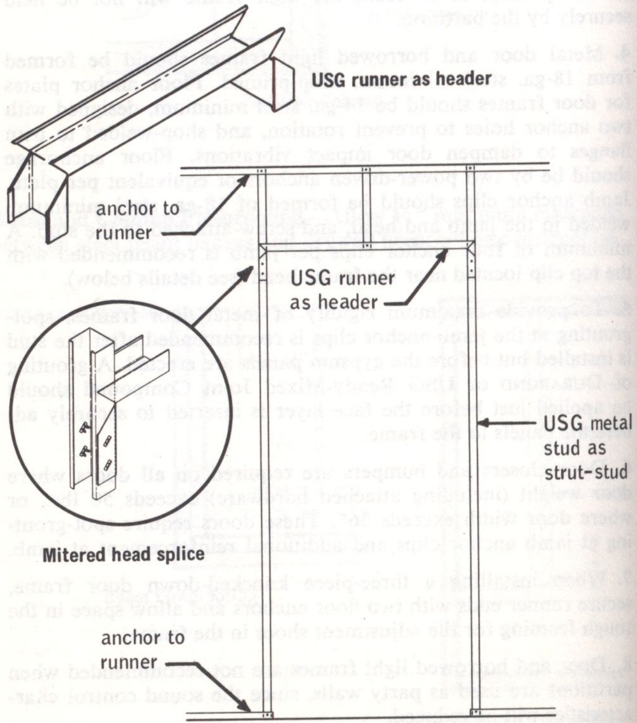
8. Door and borrowed light frames are not recommended when partitions are used as party walls, since the sound control characteristics will be reduced.

9. When ordering metal door frames, the many factors which must be considered include: gauge of frame; width and height of door; swing direction of door; type and thickness of door; and overall thickness of partition.



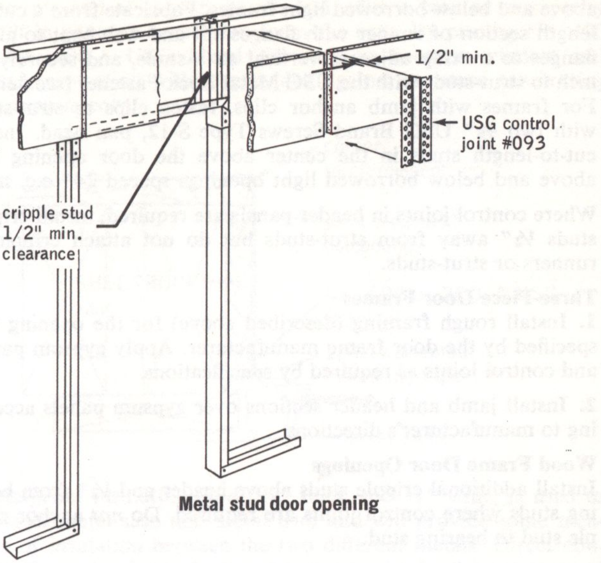

Typical floor anchor clips



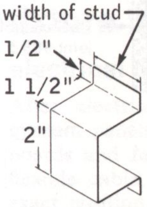

USG runner as header

Mitered head splice

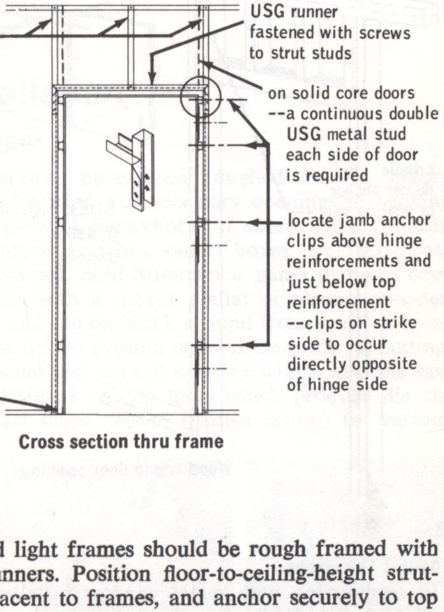
Door frame elevation



Metal stud door opening



Jamb anchor clip



Cross section thru frame

installation

Rough Framing

Door and borrowed light frames should be rough framed with metal studs and runners. Position floor-to-ceiling-height strut-studs vertically, adjacent to frames, and anchor securely to top and bottom runners with the USG Metal Lock Fastener. Where heavy or oversize doors are used, install additional strut-stud at jambs. Fabricate sill and header sections from USG Metal Runners and install over less-than-ceiling-height door frames and above and below borrowed light frames. Fabricate from a cut-to-length section of runner with flanges slit and web bent to allow flanges to overlap adjacent vertical strut-studs, and securely attach to strut-studs with the USG Metal Lock Fastener (see detail). For frames with jamb anchor clips, fasten clips to strut-studs with two ⅜" USG Brand Screws Type S-12, pan head. Install cut-to-length studs in the center above the door opening and above and below borrowed light openings spaced 24" o.c. max.

Where control joints in header panels are required, install cripple studs ½" away from strut-studs but do not attach cripple to runners or strut-studs.

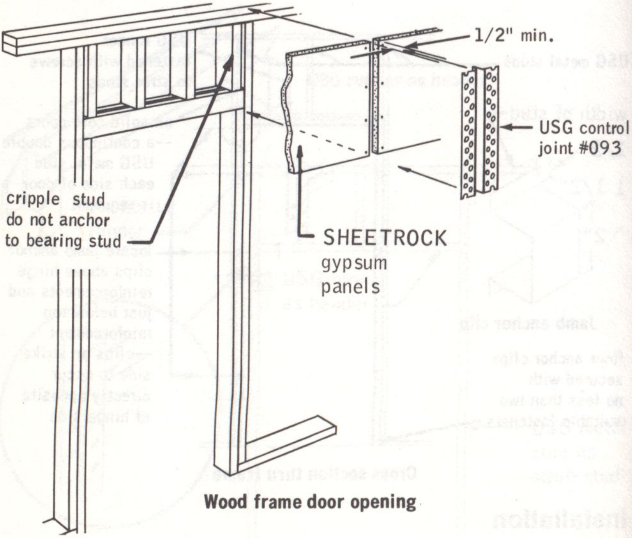
Three-Piece Door Frames

1. Install rough framing (described above) for the opening size specified by the door frame manufacturer. Apply gypsum panels and control joints as required by specifications.

2. Install jamb and header sections over gypsum panels according to manufacturer's directions.

Wood Frame Door Openings

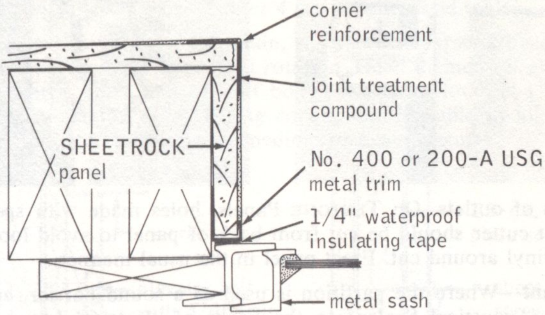
Install additional cripple studs above header and ½" from bearing studs where control joints are required. Do *not* anchor cripple stud to bearing stud.



Wood frame door opening

Metal Windows

In conjunction with metal window installation, builders often allow ⅛" to ¼" space between metal windows and end of SHEETROCK Gypsum Panels. This space is filled with caulking compound prior to painting. This method of installation allows moisture from condensation on metal window frame to penetrate into end of gypsum panels and, after a year or more, may result in paper delamination from the core. By placing No. 400 or No. 200-A USG Metal Trim casing between window and board, protection will be provided against moisture penetrating the gypsum core.

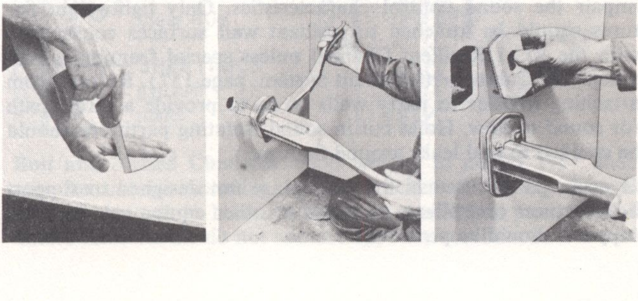


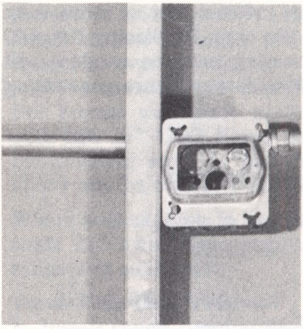
Waterproof insulating tape, 1⁄32″ thick and ¼″ wide, is used to separate metal sash and metal trim and will provide some measure of insulation between the two different metals. Direct contact of an aluminum frame and metal trim in the presence of condensation moisture may cause an electrolytic deterioration of aluminum frame.

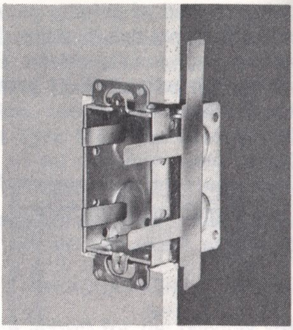
fixture installation

electrical fixtures

After electrical services have been roughed in and before gypsum panels are installed, cut necessary openings in backing boards and face layers of Sheetrock to accept rigid conduit, flexible cable, electrical switches, outlet boxes, etc. To locate exact position of cut-out, hold Sheetrock panel in place over electrical outlet. Tap with a rubber mallet or place a wooden block on the panel and tap on block around fixture with a hammer. The indentation on the gypsum panel is the guide for cutting. Remove the face panel and cut out opening with a keyhole saw or with specially designed cutting tools which produce die cut openings of the exact shape needed (shown below) for various







types of outlets. On Textone Panels, holes made with special outlet cutter should be cut from back of panel to avoid loosening vinyl around cut. Erect panel in the usual manner.

Sealant—Where the partition is used as a sound barrier, apply USG Acoustical Sealant to the backs of electrical boxes and around all boxes to seal the cut-out. See page 141 for typical sealant application. Eliminate cutting holes back to back and adjacent to each other. Electrical boxes having a drywall ring or device cover for use as a stop in caulking (shown above) are recommended.

fixture attachment

U.S.G. Drywall Partitions provide suitable anchorage for most types of fixtures normally found in residential and commercial construction. To insure satisfactory job performance it is important to have an understanding of particular fixture attachment so that sound control characteristics will be retained and attachment will be within the allowable load-carrying capacity of the construction.

In wood frame construction, fixtures are usually attached directly to the framing or to blocking or supports attached to the framing. Blocking or supports should be provided for plumbing fixtures, towel racks, grab bars and similar items. Single or double-layer Sheetrock Gypsum Panels are not designed to support loads imposed by these items without additional support to carry the main part of the load.

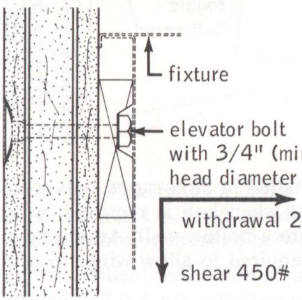
The attachment of fixtures to sound barrier partitions may impair the sound control characteristics. Only lightweight fixtures should be attached to resilient wall surfaces constructed with the RC-1 Resilient Channel unless special framing is provided (see Cabinet Attachment System, page 157). Refrain from attaching fixtures to party walls so as to provide a direct path for sound to flow. Holes cut in sound isolating partitions should be caulked to seal leaks around fixtures.

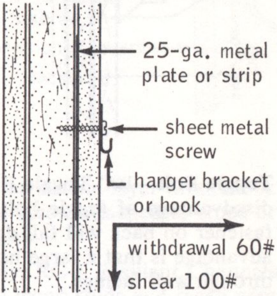
Gypsum panels used in the ceiling are not designed to support light fixtures or troffers, air vents or other equipment. Separate supports should be provided.

fixture attachment types

To provide information for proper construction, an investigation of loading capacities of various fasteners and fixture attachments used with U.S.G. Drywall Partitions was conducted at the U.S.G. Research Center. The following fasteners or attachments were tested. See Chapter 4 for fastener load tables.

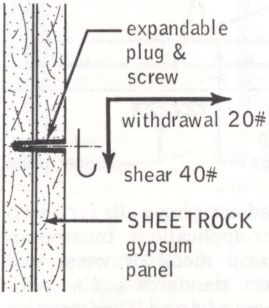
⅜″ Elevator Bolt—a flat, plain, circular countersunk head bolt with a square neck to prevent rotation. Head diameter is slightly over three times that of bolt body. The large low head shape provides a flush wide bearing connection. Suitable in all laminated gypsum partitions for medium or heavy fixtures.

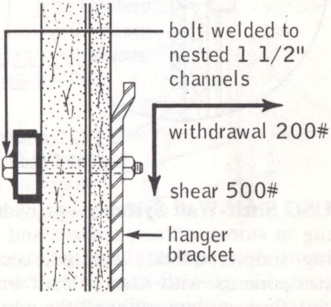




No. 8 Sheet Metal Screw—driven into 25 ga. minimum sheet metal plate or strip laminated between face board and coreboard in laminated gypsum partitions. Also may be inserted through SHEETROCK Gypsum Panels into a USG Metal Stud. Ideal for pre-planned light fixture attachment.

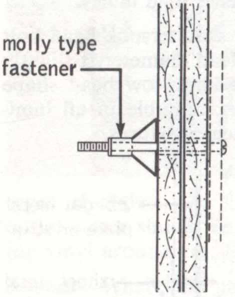
Plastic Expansion Plug—No. 8 sheet metal screw into 4-12 plastic plug. This anchor consists of a plastic tubular shield split at one end. A threaded hole in the center is provided to receive sheet metal screw. Annular ribs are provided on outside of plug to assure a positive grip in SHEETROCK. As screw is inserted, split end of plug expands (rear of plug) and holds assembly in place. Suitable for attaching lightweight fixtures in all partitions.

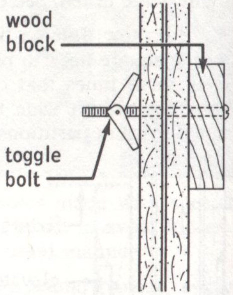




Bolt and Nested Channels—Bolt welded to nested 1½″ channels for use in mounting hanger brackets for heavy fixtures. Suitable for use in laminated gypsum partitions, provided that fixture attachments do not contact opposite coreboard.

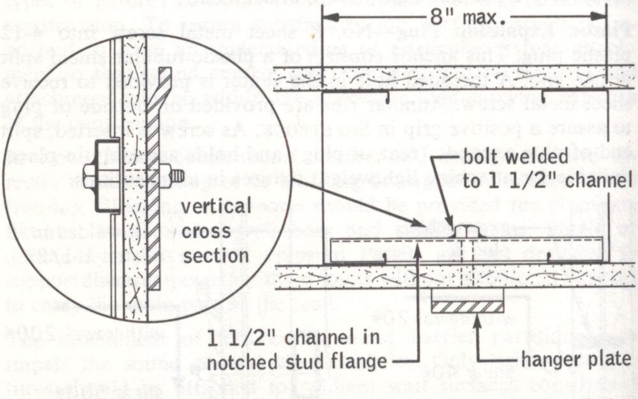
Molly Bolt—¼″ Molly Bolt installed in Sheetrock Gypsum Panel only. One advantage of this type fastener is that threaded section remains in wall when screw is removed. Also, widespread spider support formed by the expanded anchor spreads load against wall material, increasing load capacity.





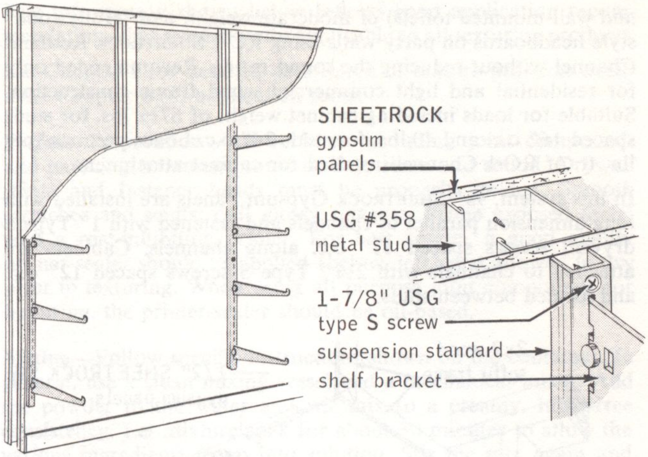
Toggle Bolt—¼″ Toggle Bolt installed in Sheetrock only. One disadvantage of toggle bolt is that when bolt is removed, wing fastener on back will fall down into a hollow wall. Another disadvantage is that a large hole is required to allow wings to pass through wall facings.

Bolt and 1½″ Channel—Bolt welded to single 1½″ channel and inserted in notches cut in USG Metal Stud for use in mounting hanger brackets for heavy fixtures. Suitable for use in USG Metal Stud Drywall Partition with No. 358 Metal Studs.



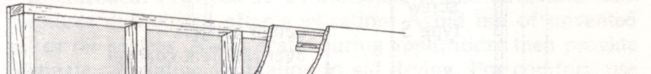
USG Shelf-Wall Systems—provide load-carrying walls for shelving in stores, offices, schools and other applications. Incorporating simple, quickly erected, economical metal or wood stud components with Garcy shelf brackets, standards and accessories, these systems offer all the advantages of drywall construction plus structural strength for shelving and merchandise.

In the metal-framed assembly, 3⅝″ USG Metal Studs spaced no more than 24″ o.c. are securely fastened to floor and ceiling run-



ners and surfaced with either single or double-layer SHEETROCK gypsum panels. Slotted standards are screw-attached to studs or steel reinforcing inserted between layers.

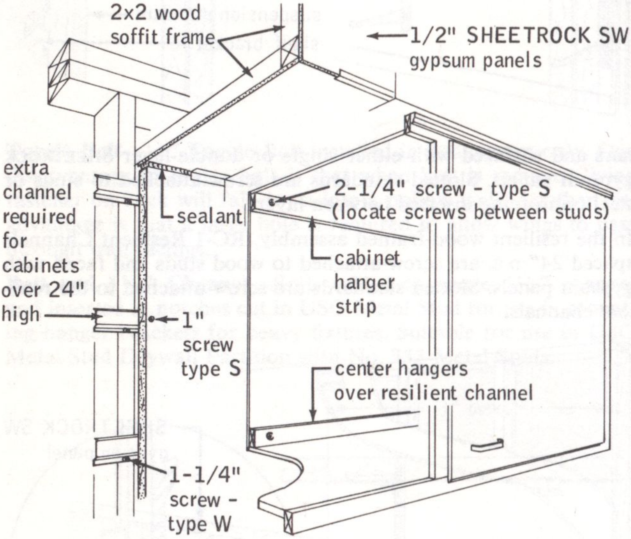
In the resilient wood-framed assembly, RC-1 Resilient Channels spaced 24" o.c. are screw-attached to wood studs and faced with gypsum panels. Slotted standards are screw-attached to the resilient channels.



The systems provide a load-carrying partition but with metal studs, the partition is not structurally load-bearing. Limiting height: 16 ft. For specific system construction and load characteristics of shelf brackets see U.S.G. Bulletin WB-938.

Cabinet Attachment System—permits installation of kitchen and bathroom cabinets, other cabinets and fixtures (except lavatories and wall-mounted toilets) of moderate weight, and "Hollywood" style headboards on party walls using RC-1 SHEETROCK Resilient Channel without reducing the sound rating. Recommended only for residential and light commercial wood frame construction. Suitable for loads including cabinet weight of 67½ lbs. for studs spaced 16" o.c. and 40 lbs. for studs 24" o.c. Loads are max. per lin. ft. of RC-1 Channel installed for cabinet attachment.

In this system, ⅝" SHEETROCK Gypsum Panels are installed with long dimension parallel to channels and fastened with 1" Type S drywall screws spaced 12" o.c. along channels. Cabinets are attached to channels with 2¼" Type S screws spaced 12" o.c. and located between studs.


2x2 wood soffit frame
1/2" SHEETROCK SW gypsum panels
extra channel required for cabinets over 24" high
sealant
2-1/4" screw - type S (locate screws between studs)
cabinet hanger strip
1" screw type S
center hangers over resilient channel
1-1/4" screw - type W

texture finish application

Textured finishes for drywall surfaces are accepted for their decorative beauty and ability to obscure minor surface imperfections with economical spray application. U.S.G. offers a full line of products to create fine, medium or coarse textures, sand or simulated acoustical finishes or interesting patterned walls with stipple brush, stencils or other pattern devices.

Application procedures vary with the individual texturing product and the particular texture desired. Specific directions shown on the product container should always be followed. For spray application data describing pressures and equipment specifications for particular products, refer to U.S.G. Paint Application Methods direction sheets available from your U.S.G. representative.

The information shown below reflects good application recommendations that are generally applicable to all texturing products.

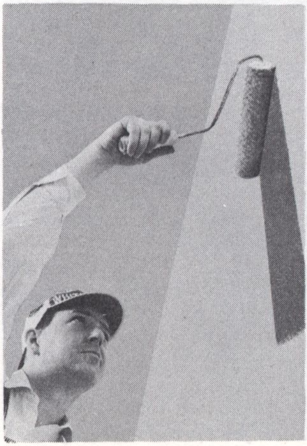
See Chapter 1 for detailed description of texture products available; Chapter 6 for application tools.

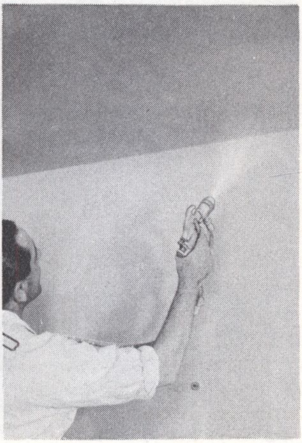
Surface Preparation—All surfaces, including joint compounds and patching treatment, must be dry, clean and sound. Drywall joints and fastener heads must be properly treated. Smooth scratches and scuffs; dull glossy surfaces. Prime exposed metal with a rust-inhibiting primer. For best results, a good quality primer-sealer should be applied (below, left) and allowed to dry prior to texturing. When using all purpose joint compounds for texturing, the primer-sealer should be oil-based.

Mixing—Follow specific instructions shown on the container. In general, use a clean mixing vessel and a mechanical mixer. Add the powder to the water and stir mix to a creamy, lump-free consistency. Let mixture soak for about 30 minutes to allow the various ingredients to go into solution. Stir the mix again and proceed with application. Adjust mix to proper spraying consistency (below, right) for the texture desired with small additions of powder or water. Do not overthin as poor adhesion, lack of hide, color and texture uniformity may result.

Application—Follow directions shown on the container for brush, roller or spray application and texture desired. Application below grade or in high humidity areas generally is not recommended. Provides 55°F. atmospheric and structural temperatures during and after application. Avoid use of unvented gas or oil heaters. Avoid drafts during application; then provide adequate circulating ventilation to aid drying. For comfort, use a respirator and protect eyes.

Storage—Store texturing products in a cool dry place. Close opened containers as air-tight as possible.





Care of Equipment—Thoroughly clean all equipment with water after each mix or at end of day as required by product directions.

Decorating—Some texture products may be tinted with suitable pigments or paints, but care should be taken when tinting since many pigments have a tendency to "float" to the surface unevenly and give an objectionable appearance. Check limitations shown on container. For best results, texture finishes should be painted to add color and washability.

curved surfaces and arches

SHEETROCK Gypsum Panels can be formed to almost any cylindrically curved surface. To apply panels, place a stop at one end of the curve and gently and gradually push on other end of panels, forcing center against framing until curve is complete.

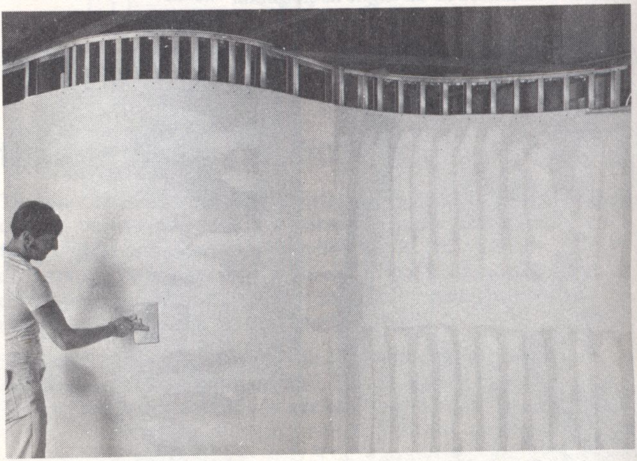
By moistening the face and back paper thoroughly prior to application, and replacing in the stack for at least one hour, the board may be bent to still shorter radii. When the panel dries thoroughly, it will regain its original hardness.

Minimum Bending Radii of Dry SHEETROCK Panels

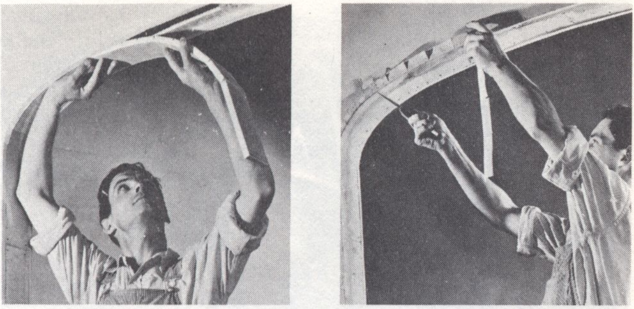
Thickness	Length	Width
½″	20′**	
⅜″	7½′	25′
¼″	5′	15′

**Bending two ¼″ pieces successively permits radii shown for ¼″ SHEETROCK.

Arches of any radii are easily faced with SHEETROCK Gypsum Panels and finished with a U.S.G. joint system. Score or cut through back paper of panels at 1″ intervals to make them



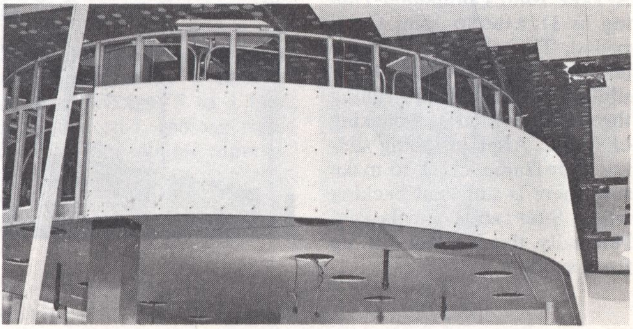
Effective use of SHEETROCK Panels for curved wall surface.



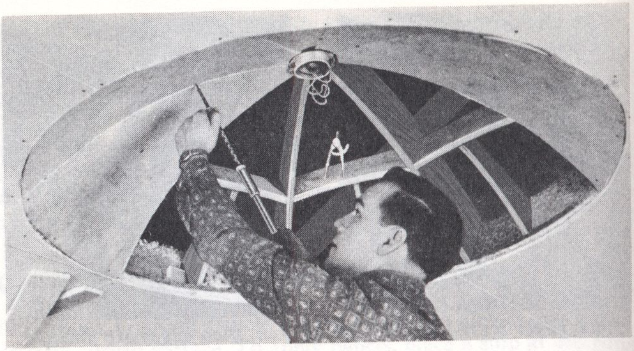
Back paper scored to conform to arch, then edges are finished.

flexible. The panels should previously have been cut to desired width and length of arch.

After panels have been applied to arch with nails or screws, butter horizontal and vertical corner surfaces with compound. Crease PERF-A-TAPE in center. Make scissor cuts half-way through tape every ¾″ to make tape flexible. Apply tape half with cuts to wall surface, and fold over uncut half of tape onto underside of arch, as shown. Embed and apply second and third finishing coats of joint compound.

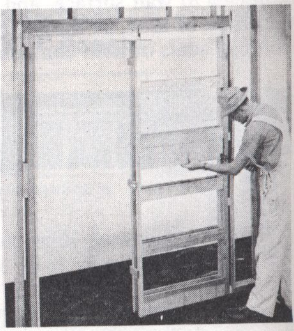


Construction and finished views of curved facade in store.

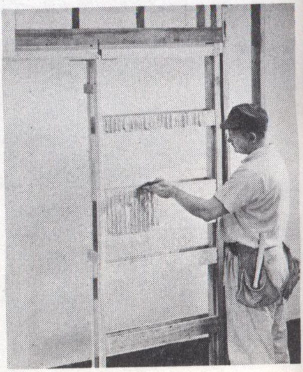


Curved panel sections form housing for lighting fixture.

sliding doors

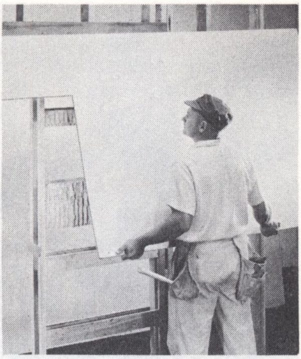


Sliding Door Frame — SHEETROCK is laminated to framing members with PERF-A-TAPE Joint Compound-Taping or DURABOND Joint Compound. This virtually prevents both fastener pops and the possibility of fasteners protruding through the usual ¾″ backing of frame. After installing sliding door frame, check to make sure there is sufficient backing where SHEETROCK panels join. Normally, this is about 4 ft. up from subfloor.



Adhesive Application — Properly measure and cut SHEETROCK to fit over frame. Using a spreader blade, spread PERF-A-TAPE Joint Compound-Taping or DURABOND Compound on section of sliding door frame to be covered first (normally the top section). This prevents pre-drying of adhesive. Joint compound should be mixed to adhesive consistency and applied in beads ½″ high, ⅜″ wide at the base and spaced 1½″ o.c.

Application of Drywall—Immediately following application of compound, apply prefitted SHEETROCK Gypsum Panels to upper section of frame. Spread lower section of frame with compound and apply pre-fitted panels.



Shoring—Once panels are in place, pieces of wood or strips of SHEETROCK are temporarily nailed to frame with 6d double headed nails to hold SHEETROCK firmly while compound dries.

Finish—When joint compound has dried (usually overnight for PERF-A-TAPE, 3 to 4 hrs. for DURABOND), remove temporary shoring, dimple remaining nail holes in the panels, and finish in normal manner.

soffits

Drywall soffits provide a lightweight, fast and economical method of filling over cabinets or lockers and of housing overhead ducts, pipes or conduits. They are made with metal stud and runner supports, faced with screw-attached SHEETROCK Gypsum Panels. Braced soffits up to 48″ deep and 72″ wide are constructed without supplementary vertical studs. Select components for the soffit size desired from table, page 164. Unbraced soffits without horizontal studs are suitable for soffits up to 24″x 24″. To retain fire protection, partitions and ceilings should be finished with gypsum panels before soffits are installed.

Soffit Design—Maximum Dimensions (1)

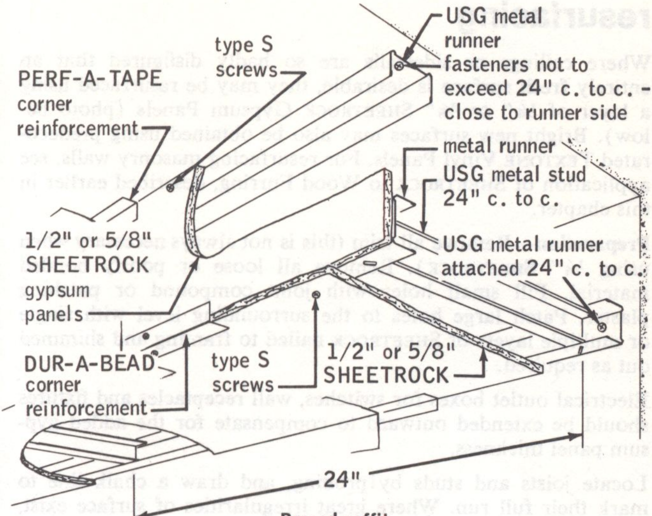
Gypsum Panel Thickness (2)	Metal Stud Size	Maximum Width	Max. Depth for Max. Width Shown
½″	1⅝″	60″	48″
½″	2½″, 3⅝″	72″	36″
⅝″	1⅝″	60″	30″
⅝″	2½″, 3⅝″	72″	18″

(1) The construction is not designed to support loads other than its own dead weight and should not be used where it may be subjected to excessive abuse.
(2) Double-layer systems and ⅜″ thick panels are not recommended for this construction

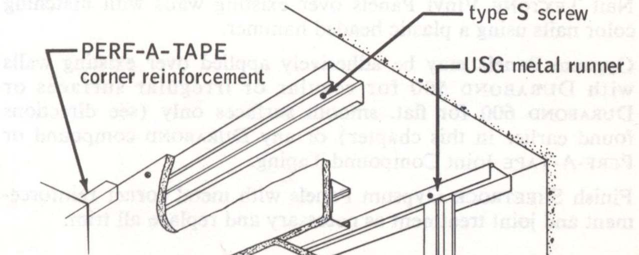
installation

Braced Soffit—Attach USG Metal Runners to ceiling and sidewall as previously described in this chapter, placing fasteners close to outside flange of runner. On stud walls, space fasteners to engage stud. Fasten vertical gypsum face panel to web of face corner runner and flange of ceiling runner with Type S screws spaced 12″ o.c. Place screws in face corner runner at least 1″ from edge of SHEETROCK panel. Insert USG Metal Studs between face corner runner and sidewall runner and attach alternate studs to runners with Metal Lock Fastener. Attach bottom face panel to studs and runners with Type S screws spaced 12″ o.c. Finish soffit with corner bead and joint treatment.

Unbraced Soffit—Attach USG Metal Studs to ceiling and sidewall, placing fasteners to engage wall and ceiling framing. Cut a gypsum panel to soffit depth and attach a soffit-length stud with Type S screws spaced 12″ o.c. Attach this pre-assembled unit to ceiling stud flange with screws spaced 12″ o.c. Attach bottom panel with Type S screws spaced 12″ o.c. Finish soffit with corner bead and joint treatment.


USG metal runner
fasteners not to exceed 24" c. to c.- close to runner side
type S screws
PERF-A-TAPE corner reinforcement
metal runner
USG metal stud 24" c. to c.
1/2" or 5/8" SHEETROCK gypsum panels
USG metal runner attached 24" c. to c.
DUR-A-BEAD corner reinforcement
type S screws
1/2" or 5/8" SHEETROCK
24"

Braced soffit


type S screw
PERF-A-TAPE corner reinforcement
USG metal runner
DUR-A-BEAD corner reinforcement
SHEETROCK SW gypsum panels
USG metal stud

Unbraced soffit

resurfacing

Where ceilings or sidewalls are so badly disfigured that an entirely fresh surface is desirable, they may be resurfaced using a layer of ¼″ or ⅜″ SHEETROCK Gypsum Panels (photo below). Bright new surfaces may also be obtained using predecorated TEXTONE Vinyl Panels. For resurfacing masonry walls, see application of SHEETROCK to Wood Furring, described earlier in this chapter.

Preparation—Remove all trim (this is not always necessary when using ¼″ SHEETROCK). Remove all loose or poorly bonded material. Fill small holes with joint compound or patching plaster. Patch large holes to the surrounding level with single or multiple layers of SHEETROCK nailed to framing and shimmed out as required.

Electrical outlet boxes for switches, wall receptacles and fixtures should be extended outward to compensate for the added gypsum panel thickness.

Locate joists and studs by probing, and draw a chalk line to mark their full run. Where great irregularities of surface exist, apply furring strips not over 16″ o.c., using wood shingles to shim out to a true, even plane.

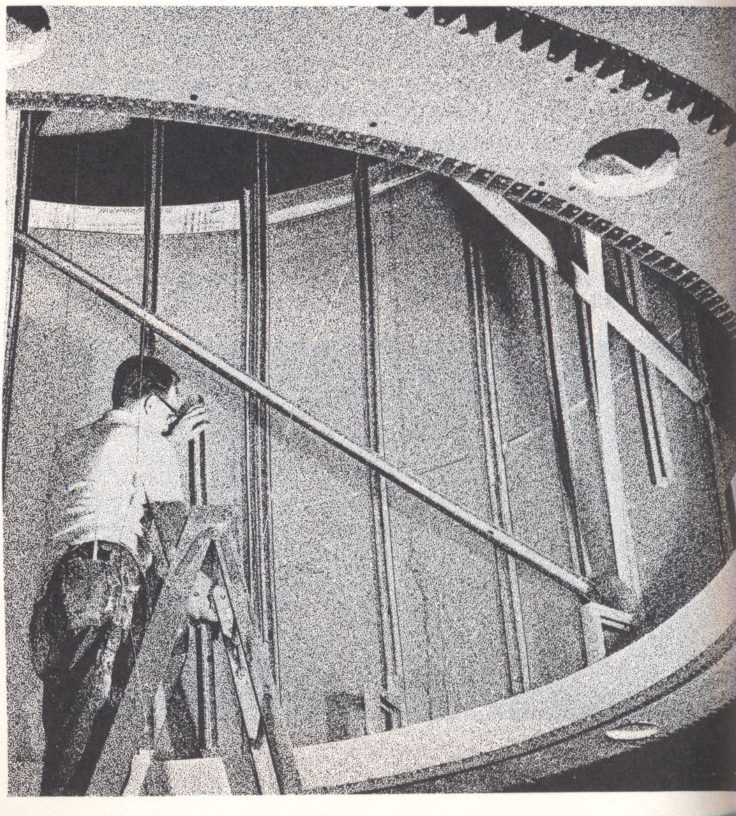
Installation—Apply SHEETROCK horizontally or vertically, whichever method is most practical. Fasten with gypsum panel nails, cement coated, spaced 7″ on ceilings, 8″ on sidewalls. Nails must be long enough to penetrate into framing members at least ⅝″. Nail TEXTONE Vinyl Panels over existing walls with matching color nails using a plastic headed hammer.

Gypsum Panels may be adhesively applied over existing walls with DURABOND 500 for regular or irregular surfaces or DURABOND 600 for flat, smooth surfaces only (see directions found earlier in this chapter) or any DURABOND compound or PERF-A-TAPE Joint Compound-Taping.

Finish SHEETROCK Gypsum Panels with metal corner reinforcement and joint treatment as necessary and replace all trim.

chapter 3

construction standards—system installation



page

WOOD STUD PARTITIONS 170

Single Layer 170

Double Layer 172

Resilient Channel 173

Staggered Stud 175

METAL STUD PARTITIONS 176

Single Layer 177

Double Layer 178

"Series 4" 180

Sound Deadening Board 181

Chase Wall 183

SPECIAL PARTITIONS 184

Vent Shaft 184

Shaft Wall 188

MOVABLE PARTITIONS 189

USG Demountable 189

ULTRAWALL 190

CEILINGS 191

Single Layer 191

Double Layer 192

Resilient Channel 194

Metal Furring Channel 195

Radiant Heated 197

Caged Beam Construction 198

EXTERIOR WALL FURRING

Metal Furring Channel 202

INSO-BAK Furring Systems 206

COLUMN FIREPROOFING 210

2-hour Assemblies 210

3-hour Assemblies 211

4-hour Assemblies 211

U.S.G. drywall systems

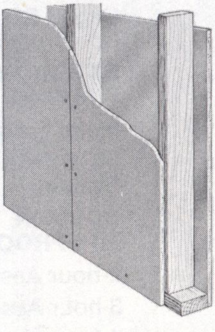
U.S.G. gypsum panels and accessories are perfectly matched to the wall and ceiling assemblies which have won for drywall a large, fast-growing share of the apartment and non-residential construction market. U.S.G. has pioneered the development of such systems, and has perfected dozens of product applications specifically for this use.

These systems add new advantages to those which have enabled drywall to dominate residential construction. In high-rise and multiple-unit structures, drywall systems outperform other types in *light weight, speed of installation, space saving, over-all economy, movability,* and *predecorated or easily decorated* surfaces. Through advanced "package" design, they now also meet most requirements—usually No. 1 in importance—for *fire resistance* and *sound transmission loss* (See Chapter 4 for fire and sound test data). They should not be used where exposed to abnormal moisture or excessively high humidity or temperature.

Major U.S.G. partition, ceiling, furring, and fireproofing systems are outlined on the following pages. Each system is described and illustrated, with advantages outlined for the construction. Recommended applications and limitations are given together with a full list of materials needed. See Chapter 1 for complete information on products mentioned. See Chapter 2 for installation methods to use in applying various types of panels, fasteners, trim, accessories, caulking and joint treatment. For complete architectural specifications and details see U.S.G.'s current Architectural Technical Literature.

wood stud partitions

single layer—wood stud partitions



In this basic load-bearing drywall partition SHEETROCK SW Gypsum Panels are either horizontally or vertically applied directly to conventional 2x4 wood studs. Attachment is by nails, screws or the adhesive nail-on method. Maximum stud spacing for ⅜″ SHEETROCK is 16″ o.c.; for ½″ and ⅝″ SHEETROCK, 24″ o.c.

To upgrade job quality, Back-Blocking, Double Nailing and Floating Interior Angles may be used. Joints and fasteners are finished with a U.S.G. joint system.

The use of predecorated TEXTONE Vinyl Panels eliminates joint treatment and decorating. With Foil-Back SHEETROCK Panels, the system is effective as a vapor barrier, offers significant insulating value, and provides economical furring for exterior walls.

advantages

1-hour Fire Rating with ⅝″ SHEETROCK SW FIRECODE Panels.

Light Weight—6 to 7 psf for conventional assemblies.

Versatile—Widely accepted for interior partitions in all types of residential and commercial buildings with wood framing.

Economical—Quickly erected using readily available, low-cost materials.

Sound Control—STC Median 35 with ⅝″ thick panels.

materials

1. **Gypsum Panels**—48″ wide—(⅜″) (½″) (⅝″) thick SHEETROCK SW (Regular) (Foil-Back); (½″) (⅝″) thick SHEETROCK SW FIRECODE; ½″ thick TEXTONE Vinyl Panels (finish); (½″) (⅝″) thick SHEETROCK W/R Panels—lengths as required.

2. **Joint Treatment**—Select a U.S.G. Joint System (choose from Chapter 1).

3. **Adhesive**

   —(for Back-Blocking System)—DURABOND Joint Compound-Taping or 90 or PERF-A-TAPE Joint Compound-Taping.

   —(for Adhesive Nail-On Board Application)—DURABOND 200 or 300 Adhesive.

4. **Fasteners**
   —Screws—1¼″ USG Brand Screw Type W.
   —Nails (choose type from Chapter 1).

5. **Metal or Vinyl Trim**—(choose type from Chapter 1).

6. **TEXTONE Moldings** (for TEXTONE Vinyl Panels)—to match finished as required.

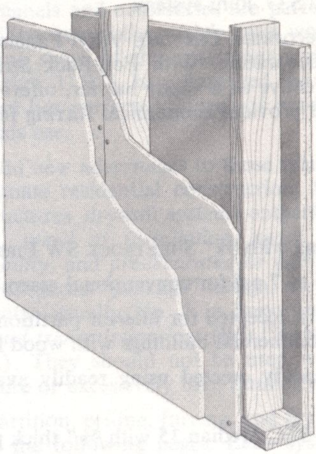
7. **Corner Bead**—DUR-A-BEAD or ECONO Corner Reinforcement or No. 900 Corner Bead (choose type from Chapter 1).

8. **W/R Sealant** (for SHEETROCK W/R Gypsum Panels)—SHEETROCK Brand W/R Sealant.

9. **THERMAFIBER Sound Control Blankets** (choose size from Chapter 1).

10. **USG Control Joint No. 093.**

double layer—wood stud partitions



In these load-bearing partitions, a base layer of SHEETROCK Panels, BAXBORD Gypsum Backing Board or USG Sound Deadening Board is nailed or screwed to 2x4 wood studs, 16″ or 24″ o.c. The SHEETROCK Panel face layer is applied to the base layer, then finished with a U.S.G. Joint System and decorated—these steps unnecessary when predecorated TEXTONE Panels are used.

In double-layer systems the reduced use of face-layer fasteners results in finer appearance. To further reduce the possibility of nail popping and angle cracking, see *floating interior and exterior angle* construction (see details, Chapter 2). Greater strength and higher fire and sound resistance are also available.

fire-rated construction

2 layers ⅝″ SHEETROCK SW FIRECODE Gypsum Panels each side of 2x4 wood studs 16″ o.c.; base layer vertically applied and attached with 6d nails 6″ o.c.; face layer horizontally applied and laminated to base; all joints staggered; joints finished.

Other double-layer assemblies providing different combinations of sound and fire resistance are available (see Chapter 4).

advantages

2-hour Fire Rating with double-layer ⅝″ thick SHEETROCK FIRECODE SW Panels.

Finer Appearance—Fewer chances for fastener defects; call-backs reduced; easily decorated.

Fast Erection—cuts building time, permits earlier occupancy.

Sound Control—STC Median 45 with ¼″ thick base layer and ½″ thick face layer.

materials

1. **Faceboards**—48″ wide—(⅜″) (½″) (⅝″) thick SHEETROCK SW; (½″) (⅝″) thick SHEETROCK SW FIRECODE "C"; ½″ thick TEXTONE Vinyl Panels (finish); (½″) (⅝″) thick SHEETROCK W/R Gypsum Panels; ⅝″ thick SHEETROCK W/R FIRECODE "C" Gypsum Panels—lengths as required. *Note: Use only ⅝″ thick gypsum panels for fire-rated construction.*

2. **Backing Board**—48″ wide—(¼″) (⅜″) (½″) (⅝″) thick SHEETROCK SW; (½″) (⅝″) thick Foil-Back SHEETROCK SW; (½″) (⅝″) thick SHEETROCK SW FIRECODE; (⅜″) (½″) (⅝″) thick BAXBORD Gypsum Backing Board; (½″) (⅝″) thick BAXBORD FIRECODE; lengths as required. *Note: Use only ⅝″ thick gypsum panels for fire-rated construction.*

3. **Joint Treatment**—Select a U.S.G. Joint System (choose from Chapter 1).

4. **Laminating Adhesive**—DURABOND Joint Compound-Taping or 90 or PERF-A-TAPE Joint Compound-Taping (for fire-rated construction), DURABOND 600 Adhesive.

5. **Fasteners**
   - —Screws—1¼″ USG Brand Screw Type W.
   - —Nails (choose type from Chapter 1).
   - —Staples—16-ga. flat galvanized wire, ½″ wide, (1″) (1⅛″) (1¼″) long with divergent points.

6. **Metal or Vinyl Trim**—(choose type from Chapter 1).

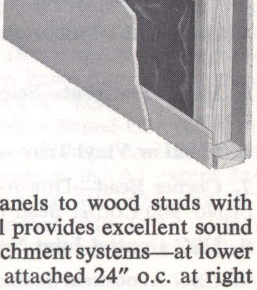
7. **TEXTONE Moldings** (for TEXTONE Vinyl Panels)—to match finishes as required.

8. **Corner Bead**—DUR-A-BEAD or ECONO Corner Reinforcement or No. 900 Corner Bead (choose type from Chapter 1).

9. **W/R Sealant** (for SHEETROCK W/R Gypsum Panels) SHEETROCK Brand W/R Sealant.

10. **USG Control Joint No. 093.**

11. **USG Acoustical Sealant.**



resilient channel–wood stud partitions

The resilient attachment of gypsum panels to wood studs with the RC-1 SHEETROCK Resilient Channel provides excellent sound isolation—exceeding the best direct attachment systems—at lower cost. The RC-1 Resilient Channels are attached 24″ o.c. at right angles to the studs with nails or screws; panels are screw-attached with 1″ USG Brand Screws Type S.

fire and sound-rated construction

Construction (A): RC-1 Channels applied with 1¼″ USG Brand Screws Type W or 6d nails to one side of 2x4 wood studs 16″ or 24″ o.c.; ⅝″ SHEETROCK SW FIRECODE face layers attached to channels one side with 1″ Type S screws 12″ o.c., applied direct to studs other side with 1¼″ Type W screws 12″ o.c.; butt end joints floated and backed with RC-1 Channels; 3″ THERMAFIBER Sound Control Blankets between studs; plates and perimeter caulked; joints finished. **Construction (B):** Wood studs with RC-1 Channels one side same as (A); double-layer ½″ SHEETROCK FIRECODE "C" Panels both sides; base layers applied vertically and attached to channels with 1″ Type S screws 24″ o.c. and to studs with 6d nails 24″ o.c.; face layers applied horizontally and attached to channels with 1$\frac{5}{16}$″ Type S screws 12″ o.c. and to studs with 6d nails 12″ o.c.; 3″ THERMAFIBER Sound Control Blankets between studs; perimeter caulked; joints finished. **Construction (C):** Same as (B) except with ⅝″ SHEETROCK FIRECODE "C" Gypsum Panels and 2″ THERMAFIBER Blankets between studs.

advantages

Fire Resistance—2-hour rating with Construction (C); 1-hour rating with (A).

Sound Control—STC Median 60 with Construction (B); STC Median 50 with (A)—superior values for wood-stud party walls.

Economy—Only four basic components required—resilient channels, drywall screws, insulating blankets and gypsum panels. These simple parts erect quickly, to create low-cost party walls.

materials

1. **Gypsum Panels**—48″ wide, ½″ or ⅝″ thick SHEETROCK SW or SHEETROCK SW FIRECODE "C" Gypsum Panels—lengths as required.

2. **Resilient Channels**—RC-1 SHEETROCK Resilient Channels.

3. **Fasteners**
   USG Screws—1″ Type S, 1$\frac{5}{16}$″ Type S, 1¼″ Type W.
   —Nails—6d cement-coated cooler type.

4. **Insulation**—THERMAFIBER Sound Control Blankets, 2″ or 3″ x 15″x96″.

5. **Joint Treatment**—Select a U.S.G. Joint System (choose from Chapter 1).

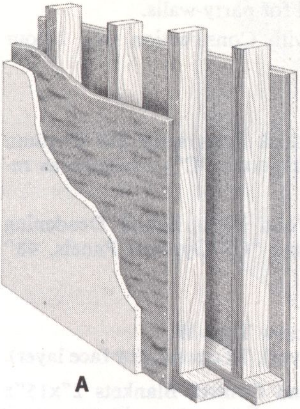
6. **Metal or Vinyl Trim**—(choose type from Chapter 1).

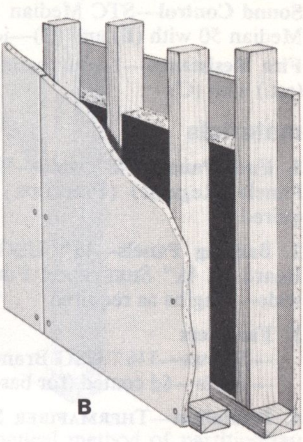
7. **Corner Bead**—DUR-A-BEAD or ECONO Corner Reinforcement or No. 900 Corner Bead (choose type from Chapter 1).

8. **USG Control Joint No. 093.**

9. **USG Acoustical Sealant.**

staggered stud partitions


A


B

The U.S.G. Staggered Stud systems offer excellent sound isolation and fire protection for drywall wood frame partitions used as party walls. The load-bearing framing consists of 2x3 wood studs 16″ o.c., staggered on opposite sides of the partition and attached to separate 2x3 plates spaced 1″ apart. With ⅝″ SHEETROCK SW FIRECODE nailed to a base layer of sound deadening board, this system provides optimum sound isolation, STC Median 55, and a 1-hour fire resistance rating. Where a fire rating is not required, single-layer ⅝″ SHEETROCK SW Gypsum Panels and 2″ THERMAFIBER Blankets between studs on one side will give the best value in this type party wall. With double-layer ⅝″ SHEETROCK SW FIRECODE "C" Panels on 2x4 staggered studs on separate plates 1″ apart, a 2-hour fire-rating (est.) and STC Median 50 is offered.

fire and sound-rated construction

Construction (A): Two rows 2x3 staggered wood studs 16″ o.c. on separate plates 1″ apart; base layer of ½″ USG Wood Fiber Sound Deadening Board applied vertically both sides; base layer attached with 6d coated nails 12″ o.c. around perimeter and at quarter and mid-points in field of panel; ⅝″ SHEETROCK SW FIRECODE Wallboard face layer applied horizontally both sides and attached with 7d coated nails 7″ o.c.; plates and perimeter caulked; joints finished. **Construction (B):** Staggered studs same as in (A); ⅝″ SHEETROCK SW Gypsum Panel face layer applied vertically both sides and attached with 1¼″ USG Brand Screws Type W spaced 16″ o.c.; 2″ THERMAFIBER Sound Control Blankets inserted between studs on one side; perimeter caulked; joints finished. **Construction (C):** Framing same as in (A) except 2x4 studs and plates; 2 layers ⅝″ SHEETROCK SW FIRECODE "C" Panels; base layer attached with 6d coated nails 16″ o.c.; face layer attached with 7d coated nails 7″ o.c., perimeter caulked; joints finished.

advantages

Sound Control—STC Median 55 with Construction (A) and STC Median 50 with (B) and (C)—ideal for party walls.

Fire Resistance—1-hour rating with Construction (A); 2-hour (est.) with (C).

materials

1. **Face Panels**—48″ wide—⅝″ thick SHEETROCK SW Gypsum Panels (Regular) (FIRECODE) (FIRECODE "C")—lengths as required.
2. **Backing Panels**—½″ USG Wood Fiber Sound Deadening Board or ⅝″ SHEETROCK FIRECODE "C" Gypsum Panels, 48″ wide—lengths as required.
3. **Fasteners**
   —Screws—1¼″ USG Brand Screw Type W.
   —Nails—6d coated (for base layer), 7d coated (for face layer).
4. **Insulation**—THERMAFIBER Sound Control Blankets 2″x15″x 96″.
5. **Metal or Vinyl Trim**—(choose type from Chapter 1).
6. **Corner Bead**—DUR-A-BEAD or ECONO Corner Reinforcement or No. 900 Corner Bead (choose from Chapter 1).
7. **Joint Treatment**—Select a U.S.G. Joint System (choose from Chapter 1).
8. **USG Control Joint No. 093.**
9. **USG Acoustical Sealant.**

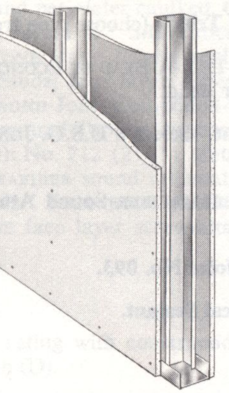
USG metal stud partitions

USG Metal Stud Partitions are lightweight, non-load bearing assemblies that have won wide acceptance for their low cost, speedy erection, fire and sound-resistant properties. They consist of steel channel studs, set in floor and ceiling runner tracks and faced each side with one or two layers of SHEETROCK SW Gypsum Panels, screw-attached. Screw heads and joints are finished with joint treatment.

Studs, available in eight widths and two types, are used with ½″ or ⅝″ SHEETROCK Panel facings applied horizontally or vertically depending on job layout, sound and fire resistance required.

Metal stud partitions offer some of drywall's best performances. Depending on the construction used (see details below), metal stud assemblies are ideal space-saving dividers within units, economical corridor partitions, or highly sound-resistant party walls.

single layer—metal stud partition



These versatile systems offer a practical method of partitioning for corridors, or within units. Screw fasteners assure positive attachment of gypsum panels, free from nail "pops."

fire and sound-rated construction

Construction (A): ½″ SHEETROCK FIRECODE "C" Gypsum Panels face layers vertically applied and screw-attached to No. 212 (2½″) Metal Studs 24″ o.c. in runners; 1″ USG Brand Screws Type S spaced 8″ o.c. at vertical joints and 12″ o.c. in field of panel; 1½″ THERMAFIBER Sound Attenuation Blankets in stud cavity; perimeter caulked; joints finished. **Construction (B):** ⅝″ SHEETROCK FIRECODE Gypsum Panels face layers vertically applied and screw-attached to No. 358 (3⅝″) Metal Studs 24″ o.c. in runners; 1″ USG Brand Screws Type S spaced as in (A); perimeter caulked; joints finished. **Construction (C):** Same as (B) but with No. 158 (1⅝″) Studs in runners.

advantages

Fire Resistance—1-hour rating for all constructions.

Sound Control—STC Median 50 with Construction (A); STC Median 50 with (B); STC Median 40 with (C).

40 See P 235 const. 29 & 3

materials

1. USG Metal Studs—No. 158 (1⅝″), 212 (2½″), 314 (3¼″), 358 (3⅝″), 400 (4″), 600 (6″).

2. USG Metal Runners—No. 158 (1⅝″), 212 (2½″), 314 (3¼″), 400 (4″), 600 (6″).

3. Face Panels—48″ wide—(½″) (⅝″) thick SHEETROCK SW or (½″) (⅝″) thick SHEETROCK SW FIRECODE or FIRECODE "C" Gypsum Panels—lengths as required.

4. Fasteners—USG Brand Screws—1″ Type S, ⅜″ Type S pan or hex washer head.

5. Metal or Vinyl Trim—(choose type from Chapter 1).

6. Corner Bead—Dur-A-Bead or Econo Corner Reinforcement or No. 900 Corner Bead.

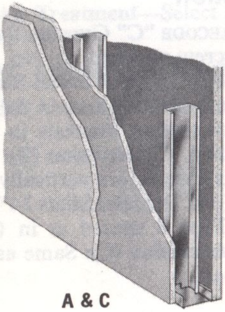
7. Joint Treatment—Select a U.S.G. Joint System (choose from Chapter 1).

8. Insulation—Thermafiber Sound Attenuation Blankets 1½″ x24″x48″.

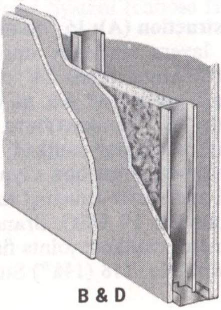
9. USG Control Joint No. 093.

10. USG Acoustical Sealant.

double layer–metal stud partition



A & C



B & D

These double layer systems are excellent for corridors and give the high STC value necessary for party walls.

fire and sound-rated construction

Construction (A): 2 layers ½″ Sheetrock SW Firecode "C" Gypsum Panels each side of No. 158 (1⅝″) Metal Studs 24″ o.c. in runners; base layer applied vertically with vertical joints staggered on opposite sides of partition; base layer screw-attached with 1″ USG Brand Screws Type S; face layer applied vertically with joints offset 12″ from base layer; face layer screw-attached with 1⅝″ Type S screws; joints finished. **Construction (B):** Same as (A) but with No. 212 (2½″) or No. 358 (3⅝″) Metal Studs;

1″, 1½″ or 2″ THERMAFIBER Sound Attenuation Blankets stapled to back side of one base layer; face layer strip laminated or screw-attached; runners and perimeter caulked. **Construction (C):** Same as (A) but with 2 layers ⅝″ SHEETROCK SW FIRECODE Gypsum Panels or TEXTONE Vinyl Panels applied each side of No. 358 (3⅝″) Metal Studs; face layer either screw-attached or laminated with DURABOND Joint Compound-Taping or 90 or PERF-A-TAPE Joint Compound-Taping; runners and perimeter caulked. **Construction (D):** No. 212 (2½″) Metal Studs 24″ o.c. on runners; 1½″ THERMAFIBER sound attenuation blankets between studs; base layer ¼″ SHEETROCK panels screw-attached; ⅝″ SHEETROCK FIRECODE face layer screw-attached; perimeter caulked; joints finished.

advantages

Fire Resistance—2 hour rating with constructions (A), (B) and (C); est. 1-hour rating with (D).

Sound Control—STC Median 55 with Construction (D); STC Median 55 (job test) with (B); STC Median 45 with (C).

materials

1. **USG Metal Studs**—No. 158 (1⅝″), 212 (2½″), 314 (3¼″), 358 (3⅝″), 400 (4″), 600 (6″).

2. **USG Metal Runners**—No. 158 (1⅝″), 212 (2½″), 314 (3¼″), 358 (3⅝″), 400 (4″), 600 (6″).

3. **Face Panels**—48″ wide, ½″ or ⅝″ thick SHEETROCK SW FIRECODE or FIRECODE "C" Gypsum Panels or ½″ thick TEXTONE Vinyl Panels—lengths as required.

4. **Backing Board**—½″ or ⅝″ thick, 24″ or 48″ wide BAXBORD FIRECODE, 8′ lengths; ¼″ thick SHEETROCK Gypsum Panels.

5. **Fasteners**—USG Brand Screws, 1″, 1$\frac{5}{16}$″ or 1⅝″ Type S, 1½″ Type G, and ⅜″ Type S pan or hex washer head.

6. **Adhesive**—DURABOND Joint Compound-Taping or 90, or PERF-A-TAPE Joint Compound-Taping (for fire-rated construction) or DURABOND 500 Adhesive.

7. **Metal or Vinyl Trim**—choose type from Chapter 1).

8. **Corner Bead**—DUR-A-BEAD or ECONO Corner Reinforcement or No. 900 Corner Bead.

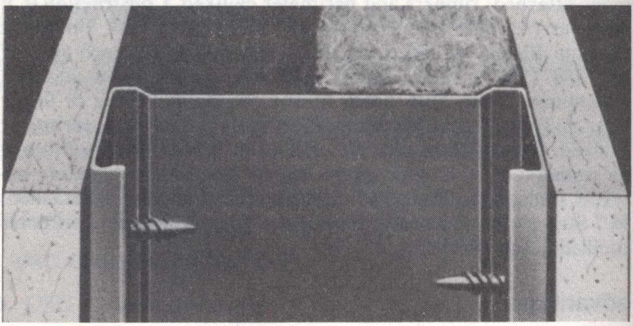
9. **Joint Treatment**—Select a U.S.G. Joint System (choose from Chapter 1).

10. **Insulation**—THERMAFIBER Sound Attenuation Blankets, 1″, 1½″or 2″x24″x48″.

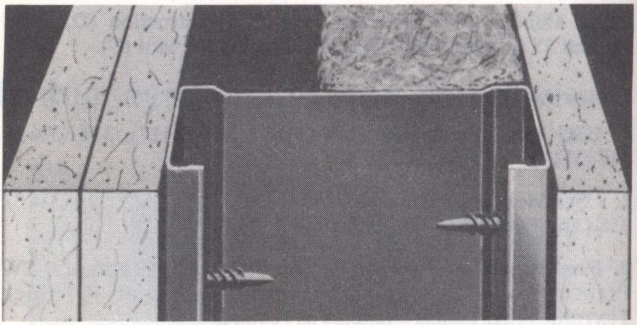
11. **USG Control Joint No. 093.**

12. **USG Acoustical Sealant.**

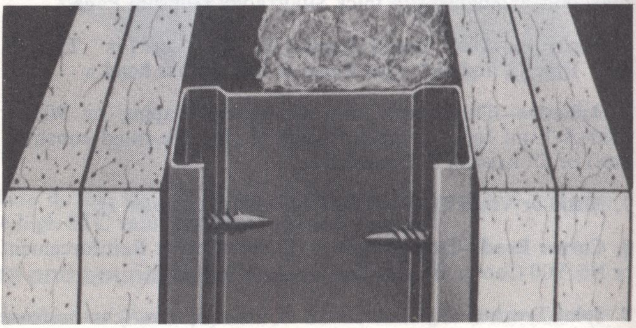
"series 4" metal stud partitions



Single layer



Unbalanced layers



Double layers

These assemblies, of uniform 4" thickness, require one door frame, gypsum panel and sound attenuation blanket thickness throughout. Simplified design and installation in single-layer, double-layer and unbalanced construction are available to meet fire and sound requirements for divider, corridor and party walls.

fire and sound-rated construction

Construction (A): ½″ SHEETROCK FIRECODE "C" gypsum panels vertically applied and screw-attached to No. 300 (3″) Metal Studs 24″ o.c. in runners; 1½″ THERMAFIBER Sound Attenuation Blankets in stud cavity; perimeter caulked; joints finished. **Construction (B):** Same as (A) but with No. 212 (2½″) Metal Studs and double-layer gypsum panels screw-attached one side of studs. **Construction (C):** Same as (A) but with No. 200 (2″) Metal Studs and double-layer panels screw-attached both sides of studs.

Fire Resistance—2-hour (est.) rating with Construction (C); 1-hour (est.) with (A) and (B).

Sound Control—STC Median 50 with Construction (C); STC Median 50 with (B); STC Median 45 with (A).

materials

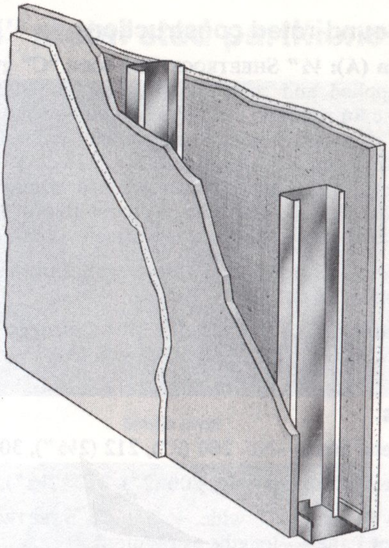
1. **USG Metal Studs**—No. 200 (2″), 212 (2½″), 300 (3″).
2. **USG Metal Runners**—No. 200 (2″), 212 (2½″), 300 (3″).
3. **Gypsum Panels**—48″ wide, ½″ thick, SHEETROCK FIRECODE "C" Gypsum Panels—lengths as required.
4. **Fasteners**—USG Brand Screws, 1″ and 1⁵⁄₁₆″ Type S and ⅜″ Type S pan or hex washer head.
5. **Metal or Vinyl Trim**—(choose type from Chapter 1).
6. **Corner Bead**—DUR-A-BEAD or ECONO Corner Reinforcement or No. 900 Corner Bead.
7. **Joint Treatment**—Select a U.S.G. Joint System.
8. **Insulation**—THERMAFIBER Sound Attenuation Blankets, 1½″ x 24″ x 48″.
9. **USG Control Joint No. 093.**
10. **USG Acoustical Sealant.**

sound deadening board—metal stud partition

With USG Mineral Fiber Sound Deadening Board as a base layer, these systems offer light weight and effective sound control for party and corridor walls at low cost.

fire and sound-rated construction

Construction (A): ⅝″ SHEETROCK FIRECODE Gypsum Panel face layer and ½″ thick USG Mineral Fiber Sound Deadening Board base layer applied each side No. 358 (3⅝″) Metal Studs 24″ o.c. in runners; both boards applied vertically with joints staggered; base layer screw-attached with 1″ USG Brand Screw Type S; face layer laminated and attached with 1⅝″ Type S screws;



runners and perimeter caulked; joints finished. **Construction (B):** Same as (A) but with ½″ Sheetrock Firecode "C" face layers applied with 1⅝″ Type S Screws 12″ o.c. to No. 158 (1⅝″) Metal Studs in runners.

advantages

1-hour Fire Rating with Construction (B); 1-hour (est.) for (A) based on performance of (B).

Sound Control—STC Median 50 with Construction (A), job test STC Median 50; STC Median 50 with (B).

materials

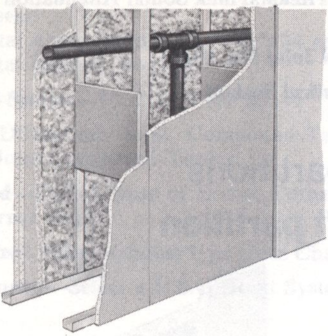
1. **USG Metal Studs**—No. 158 (1⅝″), 358 (3⅝″).
2. **USG Metal Runners**—No. 158 (1⅝″), 358 (3⅝″).
3. **Face Panels**—48″ wide, ½″ or ⅝″ thick Sheetrock SW Firecode or Firecode "C" Gypsum Panels—lengths as required.
4. **Base Layer**—USG Mineral Fiber Sound Deadening Board, ½″ thick.
5. **Fasteners**—USG Brand Screws, 1″ and 1⅝″ Type S, ⅜″ Type S pan or hex washer head.
6. **Adhesive**—Durabond Joint Compound-Taping or 90, or Perf-A-Tape Joint Compound-Taping (for fire-rated construction) or Durabond 500 Adhesive.
7. **Metal Trim**—(choose type from Chapter 1).
8. **Corner Bead**—Dur-A-Bead or Econo Corner Reinforcement or No. 900 Corner Bead.

9. Joint Treatment—Select a U.S.G. Joint System (choose from Chapter 1).

10. USG Control Joint No. 093.

11. USG Acoustical Sealant.

chase wall–metal stud partitions



USG Metal Stud Chase Wall partitions are used where greater core widths are needed for pipe chase enclosures and other service installations. Net chase widths up to 24″ are available by using the same materials and techniques required for the basic USG Metal Stud partition system.

The construction consists of a double row of 1⅝″ metal studs with gypsum panel cross braces between the rows. Double-layer ½″ SHEETROCK SW Gypsum Panels are screw-applied both sides of studs and 1½″ THERMAFIBER Sound Attenuation Blankets are stapled to the back side of one base layer. Joints are treated with a U.S.G. Joint System but may be left untreated if SHEETROCK W/R Panels are used as a base for the adhesive application of ceramic, metal or plastic wall tile.

advantages

Sound Control—STC Median 55.

Fire Resistance—2 hours (est.)

Versatility—Provides variable chase widths. Adaptable for use as party or corridor walls in all metal stud partitions.

materials

1. USG Metal Studs—No. 158 (1⅝″).

2. USG Metal Runners—No. 158 (1⅝″).

3. Gypsum Panels—½″ or ⅝″ thick, 4′ wide SHEETROCK SW, SHEETROCK SW FIRECODE "C" Gypsum Panels or SHEETROCK W/R Gypsum Panels—lengths as required.

4. **Fasteners**—USG Brand Screws—1″, 1⁵⁄₁₆″ or 1⅝″ Type S, ⅜″ Type S pan head.

5. **Metal or Vinyl Trim**—(choose type from Chapter 1).

6. **Corner Bead**—DUR-A-BEAD or ECONO Corner Reinforcement or No. 900 Corner Bead.

7. **Joint Treatment**—Select a U.S.G. Joint System (choose from Chapter 1).

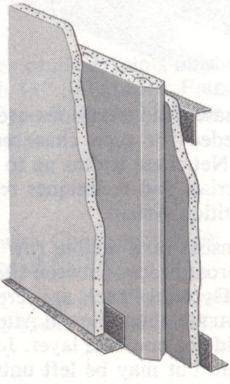
8. **Insulation**—THERMAFIBER Sound Attenuation Blankets 1½″x 24″x48″.

9. **USG Control Joint No. 093.**

10. **USG Acoustical Sealant.**

special partitions

vent shaft partition



The USG Vent Shaft Partition is a lightweight non-load bearing assembly that provides a 2-hour fire-rated enclosure for vent shafts in apartments and other buildings where shafts are widely separated. In this partition, face layers are job-laminated to gypsum coreboard secured by floor and ceiling runners.

fire-rated construction

SHEETROCK SW FIRECODE face layers, ⅝″ thick and 48″ wide, vertically applied each side over 1″ USG Coreboard; face layers laminated and screw attached; 1⅜″x⅞″x24-ga. metal angle runners placed horizontally at floor and quarter panel heights; 1⅝″ metal runner at ceiling; joints staggered and unfinished.

advantages

2-hour Fire Rating with construction above.

Lightweight—9 psf; ideal where reduced loads are required.

Space-saving—Thickness 2¼″.

Economical—Low-cost materials and a minimum number of components erect quickly for superior economy.

materials

1. **Face Panels**—5⁄8″ thick, 48″ wide, SHEETROCK SW FIRECODE Gypsum Panels—lengths as required.

2. **Coreboard**—1″ thick, 24″ wide, USG "V" T&G Edge Gypsum Coreboard—lengths as required.

3. **Metal Runners**
   —USG Metal Angle Runner 1⅜″x⅞″x24 ga.
   —USG Metal Runner, No. 158.

4. **USG Brand Screws**—1″, 2¼″ Type S; 1½″ Type G.

5. **Adhesive**—DURABOND Joint Compound-Taping or 90 or PERF-A-TAPE Joint Compound-Taping.

6. **Corner Bead**—DUR-A-BEAD or ECONO Corner Reinforcement or No. 900 Corner Bead.

7. **Metal or Vinyl Trim**—(choose type from Chapter 1).

8. **Joint Treatment**—Select a U.S.G. Joint System (choose from Chapter 1).

9. **USG Control Joint No. 093.**

installation

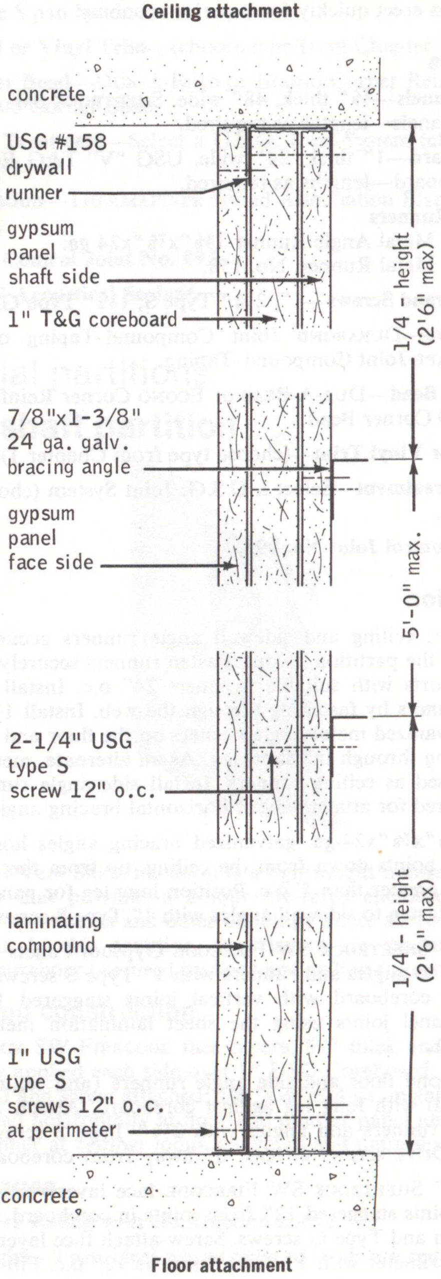
Align floor, ceiling and sidewall angle runners accurately according to the partition layout. Fasten runners securely to structural supports with suitable fasteners 24″ o.c. Install No. 158 ceiling runners by fastening through the web. Install 1⅜″x⅞″x 24-ga. galvanized metal angle runners on the floor and sidewalls by fastening through the short leg. As an alternate, metal angles may be used as ceiling runners. Install side angle runners 30″ long centered for attachment of horizontal bracing angles.

Install 1⅜″x⅞″x24-ga. galvanized bracing angles horizontally at quarter points down from the ceiling, up from the floor and spaced no greater than 5′ o.c. Position long leg for panel attachment and fasten to sidewall angles with 1″ Type S screws.

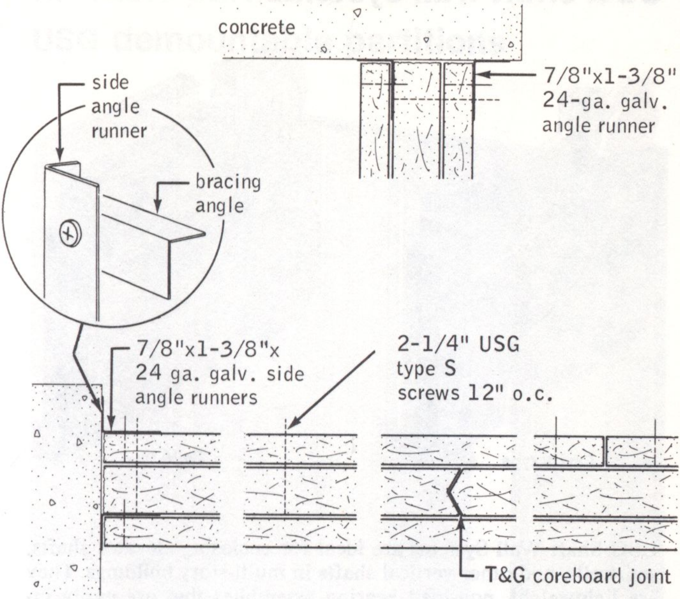
Apply 5⁄8″ SHEETROCK SW FIRECODE Gypsum Panels vertically and fasten to angles and runners with 1″ Type S screws 16″ o.c. Install 1″ coreboard with vertical joints staggered 12″ from gypsum panel joints using the sheet lamination method (see Chapter 2).

Install second floor and side angle runners (and ceiling angles, if required) with long leg against coreboard. Attach coreboard to ceiling runners and angles with 2¼″ Type S screws spaced 12″ o.c. Drive screws at least 6″ away from coreboard edges.

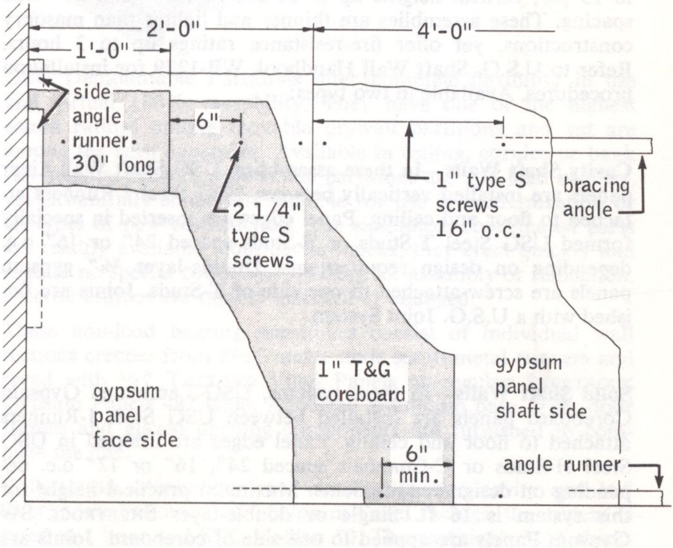
Install 5⁄8″ SHEETROCK SW FIRECODE face layer vertically with vertical joints staggered 12″ from joints in coreboard. Use sheet lamination and Type G screws. Screw-attach face layer to angles around perimeter with 1″ Type S screws 12″ o.c. Fill nail holes with joint compound and finish joints if desired.


Ceiling attachment
concrete
USG #158 drywall runner
gypsum panel shaft side
1" T&G coreboard
7/8"x1-3/8" 24 ga. galv. bracing angle
gypsum panel face side
2-1/4" USG type S screw 12" o.c.
laminating compound
1" USG type S screws 12" o.c. at perimeter
concrete
Floor attachment
1/4 - height (2'6" max)
5'-0" max.
1/4 - height (2'6" max)

Alternate ceiling attachment

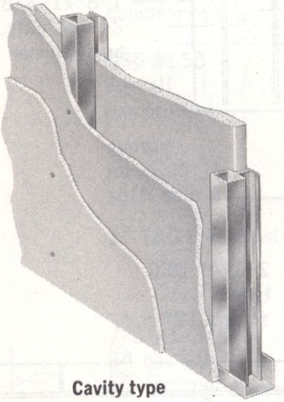


Horizontal cross section

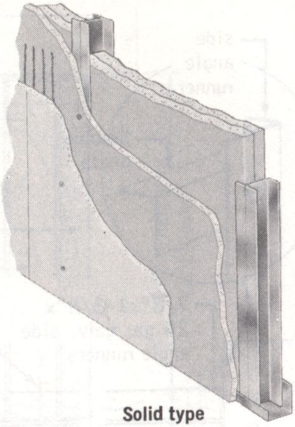


Wall elevation

USG shaft wall systems



Cavity type



Solid type

USG Shaft Wall Systems are ideal for enclosing elevator shafts, stairwells, and other vertical shafts in multi-story buildings. They are lightweight, non-load bearing assemblies that are easily installed from outside the shaft. They can be used as temporary shaft enclosures and finished later along with interior partitions. A wide range of product and installation combinations is available to meet performance requirements: air pressure loading up to 15 psf; vertical heights up to 28 ft.; 12″, 16″ and 24″ stud spacing. These assemblies are thinner and lighter than masonry constructions, yet offer fire-resistance ratings up to 3 hours. Refer to U.S.G. Shaft Wall Handbook WB-1279 for installation procedures. Available in two types:

Cavity Shaft Walls—In these assemblies, USG Shaft Wall Liner panels are installed vertically between USG Steel J-Runners attached to floor and ceiling. Panel edges are inserted in specially formed USG Steel T-Studs or E-Studs spaced 24″ or 16″ o.c. depending on design requirements. Double-layer ⅝″ gypsum panels are screw-attached to one side of T-Studs. Joints are finished with a U.S.G. Joint System.

Solid Shaft Walls—In these systems, USG Laminated Gypsum Coreboard panels are installed between USG Steel J-Runners attached to floor and ceiling. Panel edges are inserted in USG Steel H-Studs or C-Channels spaced 24″, 16″ or 12″ o.c. depending on design requirements. Maximum practical height for this system is 16 ft. Single or double-layer SHEETROCK SW Gypsum Panels are applied to one side of coreboard. Joints are finished with a U.S.G. Joint System.

movable partitions

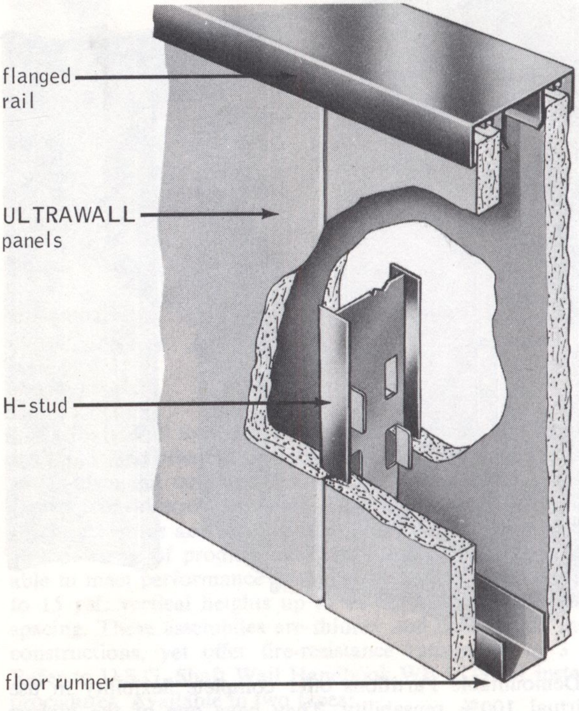
USG demountable partitions

USG Demountable Partitions offer complete flexibility in use and virtual 100% reusability. They have one of the highest sound ratings among movable drywall partitions and yet are among the least expensive. Available in ceiling, cornice or bank rail heights, these incombustible partitions are non-load bearing, yet structurally sound and suitable for use in modernization or all types of new construction. The simplified, coordinated parts are readily available from dealer stocks; they erect quickly and require no special contractor training for assembly or relocation. Electric utilities are rapidly installed or changed.

These non-load bearing assemblies consist of individual wall sections erected from 2½″ metal studs set in metal runners and faced with ½″ TEXTONE Vinyl Panels or regular SHEETROCK Gypsum Panels 48″ wide. Anodized aluminum base, trim, door frames and glazed opening components are furnished to complete the line.

With sound attenuation wool installed in stud cavity and ½″ SHEETROCK FIRECODE "C" Gypsum Panel facings, the system is rated at 1 hour and STC Median 50. The partition's 3½″ thickness permits quick installation or relocation of mechanical services. Refer to USG Demountable Partition Manual WB-1288 for installation procedures.

ULTRAWALL movable partitions



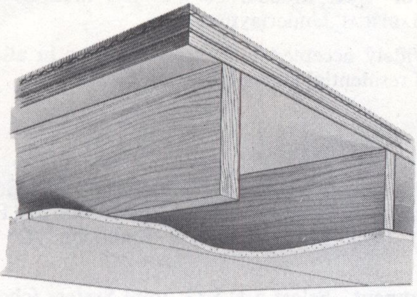
ULTRAWALL Movable Partitions are non-load bearing, flush-panel type assemblies, 3⅜″ thick, with four basic components. The simplified designs are available in ceiling, cornice or bank rail height and are distinguished for quick erection, ready movability, 1-hour fire ratings and sound ratings up to STC Median 50.

The partitions are constructed of strong, incombustible ULTRAWALL Gypsum Panels set in continuous runners and held in place with concealed studs spaced 24″ o.c. Five separate stud systems meet the widest range of requirements for fast installation, independent erection of partition facings and accessibility. The ULTRAWALL Panels, with edges beveled and integrally grooved to engage the stud, are ¾″ thick, 24″ or 30″ wide and available in mill-laminated vinyl-faced panels or plain panels ready for decoration. Openings for doors and borrowed lights are neatly formed and trimmed flush with etched and anodized aluminum accessories. Installed by authorized erectors.

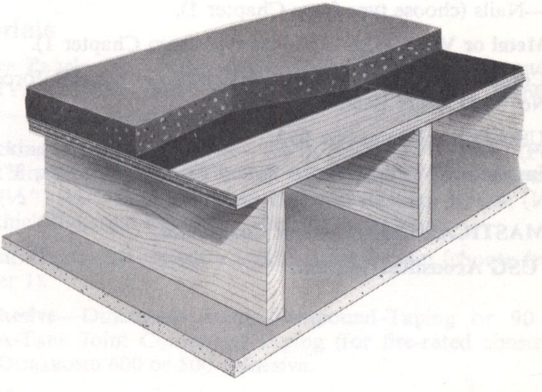
ULTRAWALL Partitions are covered by U. S. Patent Nos. 3,027,605 and 2,909,251.

ceilings

single layer—wood frame ceilings



Single-layer drywall provides economical, quickly completed ceilings in wood frame construction. SHEETROCK SW Gypsum Panels are applied horizontally (across the supports) to 2x10 wood joists 16″ o.c. Attachment may be with nails or screws. Where no fire rating is required the Adhesive Nail-On Method may be used. To upgrade job quality, Back-Blocking of butt joints and Floating Interior Angles may be used. Joints and fasteners are finished with a U.S.G. joint system.



Using FIRECODE "C" Gypsum Panels in wood joist floor/ceiling construction, a 1-hour fire rating has been obtained with ½″ thick board. Using ⅝″ SHEETROCK FIRECODE Panels will provide the same rating. MASTICAL Underlayment Compound applied over plywood or T&G sub-base (shown above) effectively resists airborne and impact sound transmission and provides an ideal surface for floor covering. With Foil-Back SHEETROCK SW Gypsum Panels, the system is effective as a vapor barrier and offers significant insulating value.

advantages

Fire Resistance—1-hour rating with ½″ FIRECODE "C" or ⅝″ FIRECODE Gypsum Panels.

Sound Control—STC Median 50 and IIC Median 35 sound rating with MASTICAL Underlayment.

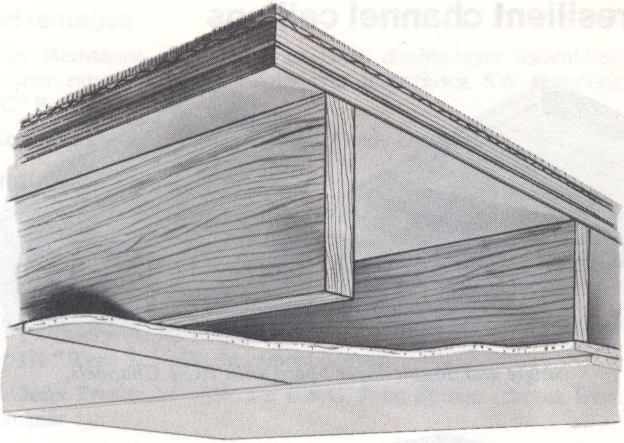
Versatile—Widely accepted for interior ceilings in all types of wood-framed residential and commercial buildings.

materials

1. **Gypsum Panels**—48″ wide—(⅜″) (½″) (⅝″) thick SHEETROCK SW (Regular) (Foil-Back); ⅝″ thick SHEETROCK SW FIRECODE; (½″) (⅝″) thick SHEETROCK SW FIRECODE "C" Gypsum Panels.
2. **Joint Treatment**—Select a U.S.G. Joint System (choose from Chapter 1).
3. **Adhesive**
   —(for Back-Blocking System)—DURABOND Joint Compound-Taping or 90; PERF-A-TAPE Joint Compound-Taping; DURABOND 200 or 300 Adhesive.
   —(for Adhesive Nail-On Board Application)—DURABOND 200 or 300 Adhesive.
4. **Fasteners**
   —Screws—1¼″ USG Brand Screw Type W.
   —Nails (choose type from Chapter 1).
5. **Metal or Vinyl Trim**—(choose type from Chapter 1).
6. **Corner Bead**—DUR-A-BEAD or ECONO Corner Reinforcement or No. 900 Corner Bead.
7. **USG Control Joint No. 093.**
8. **Insulation**—THERMAFIBER Sound Control Blankets, 3″x15″x 96″.
9. **MASTICAL Underlayment Compound.**
10. **USG Acoustical Sealant.**

double layer—wood frame ceilings

In wood-framed construction, double-layer systems create the finest ceiling surfaces available with gypsum panels. By job-laminating SHEETROCK SW Gypsum Panels to a base layer of BAXBORD Gypsum Backing Board, the possibility of imperfections due to ridging and surface fasteners is minimized. Greater strength, fire protection, and resistance to sound transmission are also added.



advantages

Fast Erection—Cuts building time; permits early occupancy.

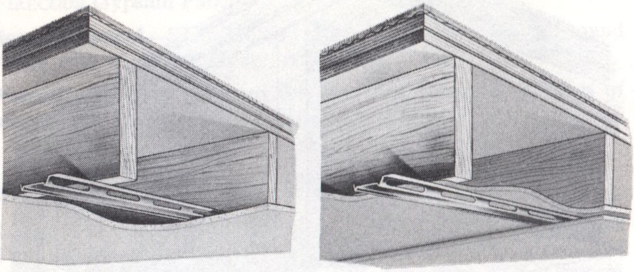
Low Maintenance—Easy decoration; reduced possibility of fastener "pops" and discoloration over fastener heads.

Economical—Low-cost materials produce greater strength, fire and sound resistance.

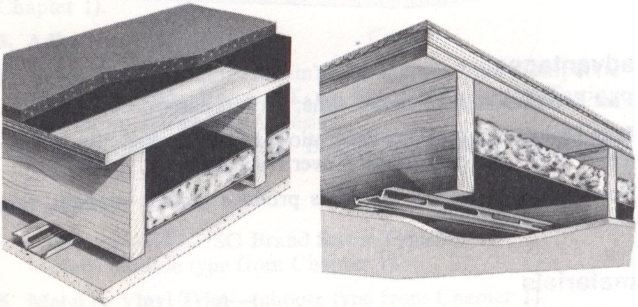
materials

1. **Face Panels**—48″ wide—(⅜″) (½″) (⅝″) thick SHEETROCK SW; (½″) (⅝″) thick SHEETROCK SW FIRECODE Gypsum Panels—lengths as required.
2. **Backing Board**—48″ wide—(⅜″) (½″) (⅝″) thick (Foil-Back) SHEETROCK SW; (½″) (⅝″) SHEETROCK SW FIRECODE; (⅜″) (½″) (⅝″) thick BAXBORD Gypsum Backing Board; (½″) (⅝″) thick BAXBORD FIRECODE—lengths as required.
3. **Joint Treatment**—Select a U.S.G. Joint System (choose from Chapter 1).
4. **Adhesive**—DURABOND Joint Compound-Taping or 90 or PERF-A-TAPE Joint Compound-Taping (for fire-rated construction), DURABOND 600 or 500 Adhesive.
5. **Fasteners**
   - —Screws—USG Brand Screws 1¼″ Type W, 1½″ Type G.
   - —Nails—(choose type from Chapter 1).
   - —Staples—16-ga. flat galvanized wire, ½″ wide, (1″) (1⅛″) (1¼″) long with divergent points.
6. **Metal or Vinyl Trim**—(choose type from Chapter 1).
7. **Corner Bead**—DUR-A-BEAD or ECONO Corner Reinforcement or No. 900 Corner Bead.
8. **USG Control Joint No. 093.**

resilient channel ceilings



Single and double-layer board with RC-1 Channels.



Insulating wool and floor underlayment or carpeting added.

Ceiling assemblies using the RC-1 Resilient Channel provide low cost, superior sound isolation and up to 2-hour fire ratings for wood joist floor/ceiling construction—qualities particularly needed in motels and apartments. The RC-1 Resilient Channels are attached 24″ o.c. at right angles to the wood joists with USG Brand Screws; gypsum panels are screw-attached with USG Brand Screws Type S.

With a double layer of ⅝″ SHEETROCK SW FIRECODE "C" Gypsum Panels separated by RC-1 Resilient Channels, a 2-hour fire resistance rating is provided. With ½″ SHEETROCK SW FIRECODE "C" Panels in this double-layer assembly, rating is 1½ hours.

The one-hour fire rating for wood joist floor-ceiling construction has been obtained by using either ½″ SHEETROCK SW FIRECODE "C" or ⅝″ SHEETROCK SW FIRECODE Panels. MASTICAL Underlayment Compound applied over plywood or T&G sub-base effectively resists airborne and impact sound transmission and provides an ideal surface for floor covering. An effective vapor barrier and significant insulating value is provided when Foil-Back SHEETROCK is used. These assemblies should not be used beneath highly flexible floor joists.

advantages

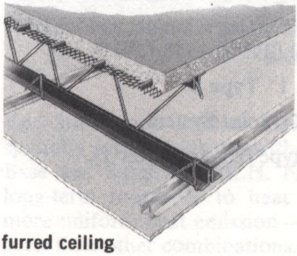
Fire Resistance—Up to 2 hours with double-layer assemblies; 1-hour rating with ½″ single-layer Sheetrock SW Firecode "C" Panels.

Economical—Low-cost materials; speedy erection.

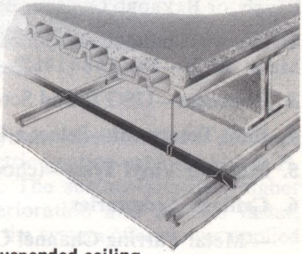
materials

1. **Gypsum Panels**—48″ wide—(½″) (⅝″) thick Sheetrock SW (Regular) or (Foil-Back); (½″) (⅝″) thick Sheetrock SW Firecode—lengths as required.
2. **Resilient Channels**—RC-1 Sheetrock Resilient Channel.
3. **Fasteners**—USG Brand Screws: 1¼″ Type W; ⅞″, 1″, 1¼″ or 1⅞″ Type S; Nails: 6d cement-coated.
4. **Joint Treatment**—Select a U.S.G. Joint System (choose from Chapter 1).
5. **Adhesive**—(for Back-Blocking)—Durabond Joint Compound-Taping or 90; Perf-A-Tape Compound-Taping.
6. **Metal or Vinyl Trim**—(choose from Chapter 1).
7. **Insulation**—Thermafiber Sound Control Blanket, (2″) (3″) x 15″ x 96″.
8. **MASTICAL Underlayment Compound.**
9. **USG Acoustical Sealant.**

metal furring channel ceilings



furred ceiling



suspended ceiling

Metal Furring Channel Systems conceal and protect structural and mechanical elements within a lightweight fire-resistant ceiling of gypsum panels. USG Metal Furring Channels, to which the panels are screw-attached, are wire-tied to bar joists, clipped or wire-tied to suspended 1½″ main runner channel grillage. For long-span requirements beneath large ducts or pipes, USG Metal Studs are substituted for furring channels. With Foil-Back Sheetrock SW Gypsum Panels, the system is effective as a vapor barrier and provides significant insulating value. Lower-cost Baxbord Gypsum Backing Board provides a firm base for acoustical tile adhesively applied.

fire and sound-rated construction

Construction (A): ⅝″ SHEETROCK FIRECODE "C" Gypsum Panels; furred USG Metal Furring Channels 24″ o.c.; panels attached with 1″ Type S drywall screws 12″ o.c.; joints exposed or finished with a U.S.G. joint system; 3″ concrete on riblath over bar joists. **Construction (B):** Same as (A) with 2½″ concrete, furred or suspended Metal Furring Channels and ½″ SHEETROCK FIRECODE "C" Panels. **Construction (C):** ⅝″ SHEETROCK SW FIRECODE Panels; furred or suspended Metal Furring Channels 24″ o.c.; panels attached with 1″ Type S screws 12″ o.c.; joints finished; 2″ concrete on riblath over bar joists. **Construction (D):** Same as (A) except 1″ MASTICAL Compound on steel deck over bar joists. **Construction (E):** Same as (A) except 1″ MASTICAL on USG Gypsum Floor Plank over bar joists.

advantages

Fire Resistance—3-hour fire rating with Construction (A), includes 3-hour beam; 2-hour rating with (B) and (D), includes 2-hour beam; 2-hour rating with (E); 1½-hour rating with (C).

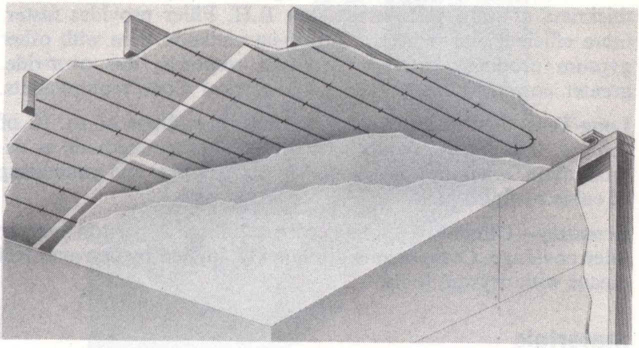
Versatility—Used in virtually all types of new construction and modernization.

Economy—Low-cost materials. Few components and simple installation result in fast erection.

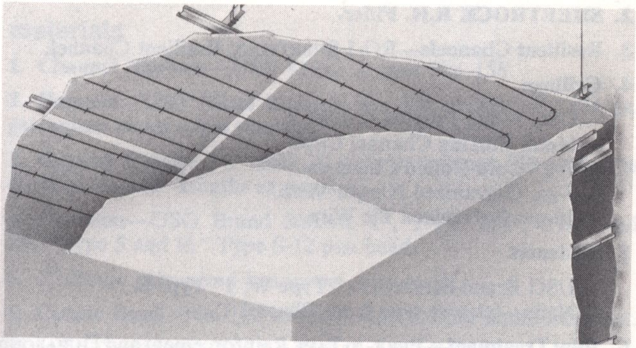
materials

1. **Gypsum Panels**—(½″) (⅝″) thick, 48″ wide SHEETROCK SW, (Regular) (Foil-Back) (FIRECODE) (FIRECODE "C") Gypsum Panels, or BAXBORD Gypsum Backing Board—lengths as required.
2. **Furring Channels**—USG Metal Furring Channel and/or USG Metal Studs—No. 158 (1⅝″)—212 (2½″)—358 (3⅝″).
3. **Fasteners**—USG Brand Screws, 1″ Type S.
4. **Joint Treatment**—Select a U.S.G. Joint System.
5. **Metal or Vinyl Trim**—(choose type from Chapter 1).
6. **Grillage Accessories**
   - —Metal Furring Channel Clip.
   - —1½″ Cold-Rolled Channels.
   - —8-ga. Galvanized Hanger Wire.
   - —16-ga. Galvanized Tie Wire.
7. **USG Control Joint No. 093.**
8. **USG Acoustical Sealant.**

radiant heated ceilings



Wood joists



Metal grillage

The SHEETROCK Radiant Heat System combines two products specially fortified for use with electric heating cable—USG R.H. Base and SHEETROCK R.H. Filler. The surface provides higher long-term resistance to heat deterioration and permits faster, more uniform heat emission—yet the system offers lower applied costs than other combinations.

The special large-size USG R.H. Base is nailed or screwed directly to wood joists—or screw-attached to USG Metal Furring Channels or to RC-1 Channels for resilient application. PERF-A-TAPE Reinforcement is applied over joints with DURABOND Joint Compound-Taping or USG Ready-Mixed Joint Compound-All Purpose. The electric cable is staple-attached, then embedded in ¼″ SHEETROCK R.H. Filler. The system is fire-rated at 1 hour with Type X base and 16″ joist spacing. SHEETROCK R.H. Filler is also applied directly to properly bonded above-grade concrete ceilings.

advantages

Heat Emission—Because of its higher density and total filler thickness of only ¼″, SHEETROCK R.H. Filler provides faster, more efficient and more uniform heat emission than with other gypsum products; gives more rapid response, less over-ride, greater comfort. Meets National Electrical Code requirements.

Long-Term Performance—Job-proven on millions of sq. ft. of ceilings, this system avoids such faults of other methods as delamination, cracking, "hot voids" in dry cavities, and puncturing of cable by finish nails.

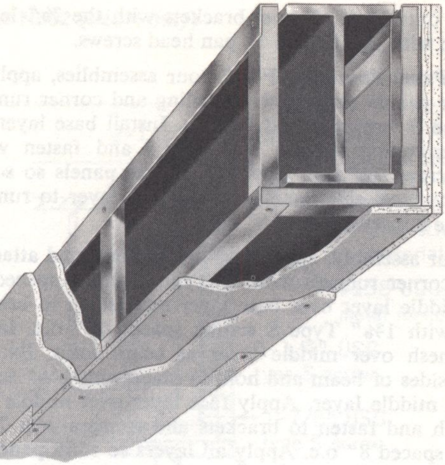
Economy—Offers low applied costs; 1,200 sq. ft. per ton average filler coverage. Components are quickly applied by conventional means with drywall tools.

materials

1. **USG R.H. Base**—48″ wide—(½″) (⅝″) thick—lengths as required.
2. **SHEETROCK R.H. Filler.**
3. **Resilient Channels**—RC-1 SHEETROCK Resilient Channel.
4. **Grillage**
   - —USG Metal Furring Channels.
   - —Metal Furring Channel Clips.
   - —1½″ Cold-Rolled Channels.
   - —8-ga. Galvanized Hanger Wire.
   - —16-ga. Galvanized Tie Wire.
5. **Fasteners**
   - —USG Brand Screws 1¼″ Type W; 1″ Type S.
   - —Nails—(choose type from Chapter 1).
6. **Joint Treatment**—PERF-A-TAPE Reinforcement and DURABOND Joint Compound-Taping or USG Ready-Mixed Joint Compound-All Purpose.
7. **USG P-2 Vinyl Trim.**
8. **USG Control Joint No. 75.**

caged beam construction

U.S.G. Caged Beam Constructions consist of a double or triple layer of ⅝″ SHEETROCK Gypsum Panels screw-attached to a framework of USG Metal Runner channel brackets and USG Metal Runners or 1⅜″x⅞″ sheet metal angles paralleling the beam. They are lightweight, fast and economical methods of housing beams with a highly decorable surface. The assemblies provide a 3-hour or 2-hour fire rating for beams supporting 2½″ concrete on the fluted steel floor units.



materials

1. **Channel Brackets**—USG Metal Runner No. 158.

2. **Runners**—USG Metal Runners No. 158 or 1⅜″x⅞″x24 ga. galvanized metal angle runners.

3. **Gypsum Panels**—⅝″ thick, 4′ wide SHEETROCK SW FIRECODE Gypsum Panels—lengths as required.

4. **Fasteners**—USG Brand Screws, 1″, 1¼″, 1⅝″, 1⅞″ and 2¼″ Type S and ½″ Type S-12 pan head.

5. 1″ 20-ga. galvanized hexagonal wire mesh.

6. **Corner Bead**—No. 103 DUR-A-BEAD Corner Reinforcement.

7. **Joint Treatment**—Select a U.S.G. Joint System (choose from Chapter 1).

installation

Suspension System Erection—Erect ceiling runners parallel to and at least ½″ away from beam. Metal angles should be positioned with the 1⅜″ leg vertical. Fasten ceiling runners to steel floor units with ½″ Type S-12 pan head screws spaced 12″ o.c.

Fabricate channel brackets from No. 158 Metal Runners to allow ½″ clearance at bottom of beam for 2-hr. construction and 1″ clearance for 3-hr. assembly. When USG Metal Runners are used for corner runners, cope or cut away legs of runner used for brackets to allow insertion of corner runner. When metal angles are used for corner runners, slit channel bracket runner legs and bend runner to right angle. Install channel brackets 24″ o.c. along the length of the beam and fasten to ceiling runner with ½″ Type S-12 pan head screws.

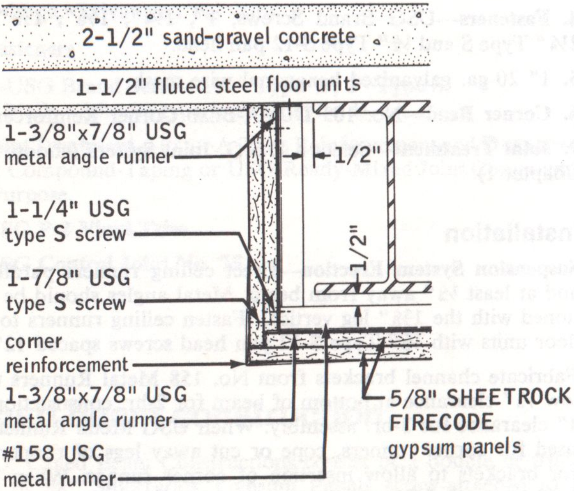
Install lower corner runners parallel to beam. Set USG Metal Runner corner runners in coped channel brackets. Apply metal angles to outside of channel brackets with the ⅞″ leg vertical and fasten with ½″ Type S-12 pan head screws.

Gypsum Panel Erection—For 2-hour assemblies, apply vertical base-layer panels and attach to ceiling and corner runners with 1¼″ Type S screws spaced 16″ o.c. Install base layer to beam soffit overlapping vertical side panels and fasten with 1¼″ Type S screws 16″ o.c. Apply face-layer panels so soffit panel supports vertical side panels. Fasten face layer to runners with 1⅞″ Type S screws spaced 8″ o.c.

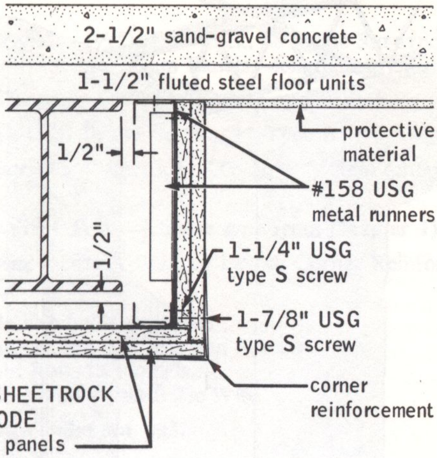
For 3-hour assembly, apply base-layer panels and attach to ceiling and corner runners with 1″ Type S screws spaced 16″ o.c. Apply middle layer over base layer and attach to brackets and runners with 1⅝″ Type S screws spaced 16″ o.c. Install hexagonal mesh over middle layer at beam soffit. Extend mesh 1½″ up sides of beam and hold in place with 1⅝″ screws used to attach middle layer. Apply face layer over middle layer and wire mesh and fasten to brackets and runners with 2¼″ Type S screws spaced 8″ o.c. Apply all layers so soffit panels support vertical side panels.

Finishing Construction—Apply corner bead to bottom outside corners of face layers and finish with joint treatment as directed in Chapter 2.

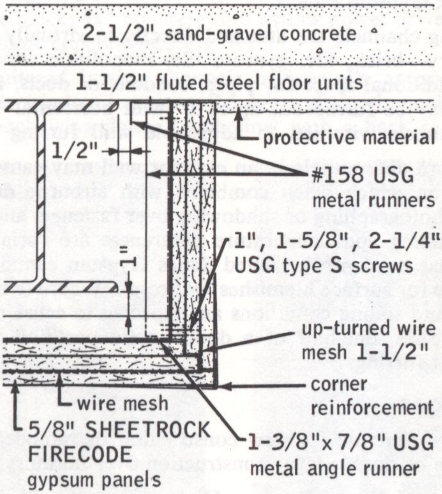
UL Design N501 (beam only)


2-1/2" sand-gravel concrete
1-1/2" fluted steel floor units
1-3/8"x7/8" USG metal angle runner
1/2"
1-1/4" USG type S screw
1/2"
1-7/8" USG type S screw
corner reinforcement
1-3/8"x7/8" USG metal angle runner
#158 USG metal runner
5/8" SHEETROCK FIRECODE gypsum panels

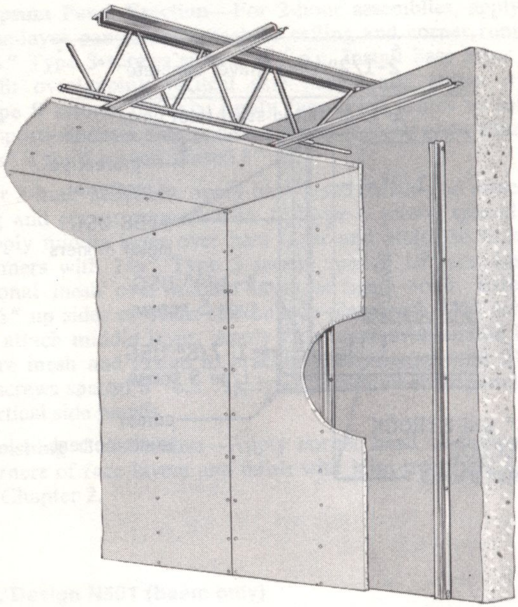
UL Design N502 (beam only)



UL Design N505 (beam only)


2-1/2" sand-gravel concrete
1-1/2" fluted steel floor units
protective material
1/2"
#158 USG metal runners
1"
1", 1-5/8", 2-1/4" USG type S screws
up-turned wire mesh 1-1/2"
corner reinforcement
wire mesh
5/8" SHEETROCK FIRECODE gypsum panels
1-3/8"x 7/8" USG metal angle runner

metal furring channel



Drywall furring of exterior masonry walls is quickly accomplished by using USG Metal Furring Channels to which the gypsum panels are screw-attached. An effective vapor barrier and significant insulating value are added to walls by using Foil-Back SHEETROCK Gypsum Panels.

The furring channels are attached directly to virtually any type of masonry—brick, tile, gypsum tile, monolithic concrete. To provide additional space for pipes, conduits or ducts, the metal channel may be furred out up to 3″ with horizontal ¾″ cold-rolled channels wire-tied to adjustable wall furring brackets.

Temperature differentials in an exterior wall may cause interior condensation which when combined with airborne dust could result in photographing or shadowing over fasteners and furring. Because soiling and temperature differences are variables over which it has no control, United States Gypsum cannot be held responsible for surface blemishes that result. Where temperature, humidity and soiling conditions are expected to cause objectionable blemishes, one-half of a double solid partition is recommended for furring.

advantages

Versatility—Suitable for new construction or remodeling; used with single or double-layer construction over masonry walls.

Insulation and Vapor Barrier—Highly effective with Foil-Back SHEETROCK facings.

Economy—Simplified components and installation procedures provide one of the lowest-cost exterior furring systems.

materials

1. **Gypsum Panels**—(½″) (⅝″) thick, 48″ wide SHEETROCK SW, (Regular) (Foil-Back) Gypsum Panels—lengths as required.
2. **Furring Channel**—USG Metal Furring Channel.
3. **Fasteners**—USG Brand Screws, 1″ Type S.
4. **Joint Treatment**—Select a U.S.G. Joint System (choose from Chapter 1).
5. **Metal or Vinyl Trim**—(choose type from Chapter 1).
6. **Corner Bead**—DUR-A-BEAD or ECONO Corner Reinforcement or No. 900 Corner Bead.
7. **Adjustable Furring Accessories**
   - —USG Adjustable Wall Furring Bracket.
   - —¾″ Cold Rolled Channels.
   - —16 or 18-ga. Galvanized Tie Wire.
8. **USG Control Joint No. 093.**

installation

Furring Channel Erection—Direct Attachment

Attach metal furring channels to masonry or concrete surfaces, either vertically or horizontally, spaced no more than 24″ o.c. For channels positioned horizontally, attach a furring channel not more than 4″ from both the floor line and the ceiling line. Secure channels with fasteners occurring on alternate channel flanges and spaced 24″ o.c. Use a 2″ cut nail in mortar joints of brick, clay tile or concrete block or in the field of lightweight aggregate block; ⅝″ concrete stub nail or power driven fasteners in monolithic concrete (see Fig. A).

Attach mitered furring channels horizontally around masonry corners at window locations. To miter channels, make two 45° cuts in each wing flange of channel with a hack saw or sheet

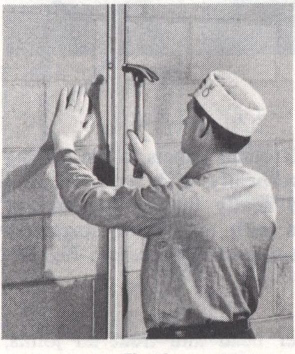


Fig. A

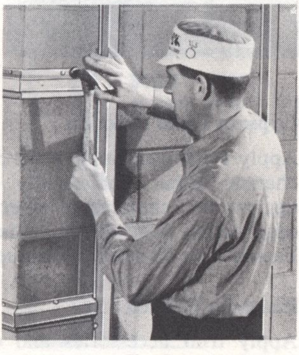


Fig. B

metal snips, but do not cut into web. Bend web until cut edges of wing flanges touch each other and channel is formed in an "L" shape (see Fig. B).

Furring Channel Erection—Wall Furring Bracket

Attach USG Adjustable Wall Furring Brackets, with serrated edges faced upward, to masonry wall in following spacing pattern: 48″ o.c. vertically, 6″ max. from floor and ceiling, 36″ o.c. horizontally, 4″ max. from columns or other abutting construction, and as required above and below windows. Fasten each bracket through hole closest to serrated edges. Use 2″ cut nails in mortar joints of brick, clay tile, concrete block, or in field of lightweight aggregate blocks; use ⅝″ concrete stub nails or power-driven fasteners in monolithic concrete. Lay ¾″ cold-rolled channels, horizontally, on furring brackets so that channel flanges engage serrated edges of bracket. Be certain each channel is plumbed to a line with ceiling and base channels. Wire-tie cold-rolled channels to each bracket with a double strand of 16-ga. or a triple strand of 18-ga. wire. Bend each excess bracket length down and inward toward wall. Vertically position furring channels with wing flanges against cold-rolled channels and space them a maximum of 24″ o.c. Wire-tie each furring channel-cold-rolled channel intersection with a double strand of 16-ga. or a triple strand of 18-ga. wire (see Fig. C).

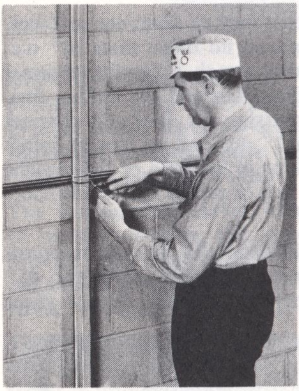


Fig. C

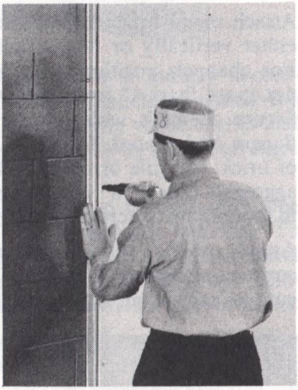


Fig. D

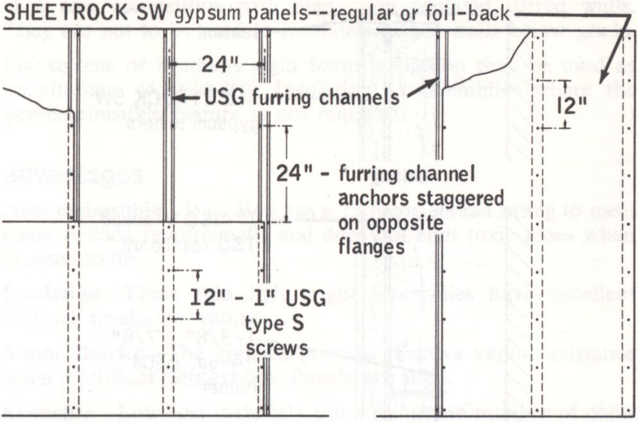
Gypsum Panel Erection

Apply Foil-Back SHEETROCK SW Gypsum Panels to the furring channel either horizontally or vertically and with the foil against the channels. Center and neatly fit abutting end or edge joints over furring channels with end joints staggered. Fasten with Type S drywall screws spaced 12″ o.c. (see Fig. D).

Finishing Furring

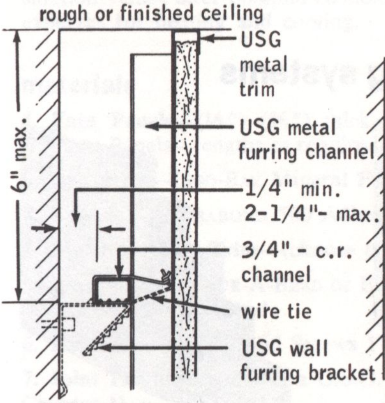
Apply trim accessories and corner bead and treat all joints, fastener heads and trim as directed in Chapter 2.

Wall elevation

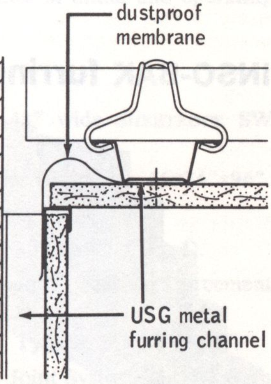

SHEETROCK SW gypsum panels--regular or foil-back
24"
USG furring channels
12"
24" - furring channel anchors staggered on opposite flanges
12"- 1" USG type S screws

Horizontal application **Vertical application**

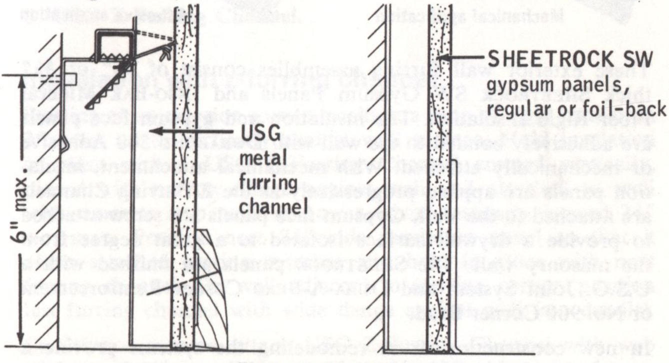
Adjustable wall furring



Ceiling attachment

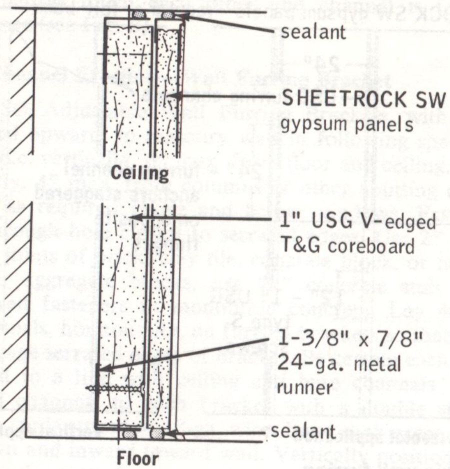


Suspended ceiling

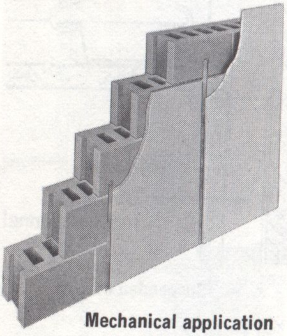

SHEETROCK SW gypsum panels, regular or foil-back
USG metal furring channel
6" max.

Floor attachment & base

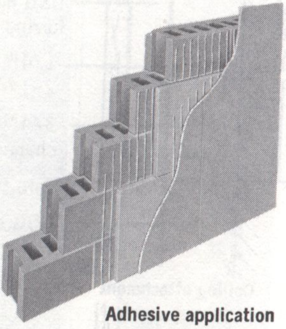
Free-standing furring


sealant
SHEETROCK SW gypsum panels
Ceiling
1" USG V-edged T&G coreboard
1-3/8" x 7/8" 24-ga. metal runner
sealant
Floor

INSO-BAK furring systems



Mechanical application



Adhesive application

These exterior wall furring assemblies consist of ½″ or ⅝″ thick Sheetrock SW Gypsum Panels and Inso-Bak Mineral Fiber Rigid Insulation. The insulation and gypsum face panels are adhesively bonded to the wall with Durabond 500 Adhesive or mechanically attached. With mechanical attachment, insulation panels are applied progressively as the Z-Furring Channels are attached to the wall. Gypsum face panels are screw-attached to provide a drywall surface isolated to a great degree from the masonry wall. The Sheetrock panels are finished with a U.S.G. Joint System and Dura-A-Bead Corner Reinforcement or No. 900 Corner Bead.

In new construction or in remodeling the systems provide a noncombustible, highly insulative, self-furred solid backup for

SHEETROCK Gypsum Panels. They provide a fully insulated wall at a cost competitive with many non-insulated furred walls. They are not to be used to insulate exterior walls below grade.

Polystyrene or urethane rigid foam insulation may be used as an alternate to INSO-BAK Insulation in assemblies where the non-combustible feature is not required.

advantages

Noncombustible—INSO-BAK has a 25 flame spread rating to meet Class A code requirements and does not emit toxic gases when exposed to fire.

Insulation—These thin lightweight assemblies have excellent thermal insulation values.

Vapor Barrier—The systems provide effective vapor resistance when Foil-Back SHEETROCK Panels are used.

Economy—Low-cost materials and a minimum number of components offer simple speedy erection; combine to provide low in-place costs, permit possible structural savings. The high insulation values offer possible economies in initial and operating expenses for heating and cooling.

materials

1. **Face Panels**—(½″) (⅝″) thick, 48″ wide SHEETROCK SW Gypsum Panels—lengths as required.
2. **Insulation**—INSO-BAK Mineral Fiber Insulation, 1″x24″x96″.
3. **Adhesive**—DURABOND 500 Adhesive.
4. **Metal or Vinyl Trim**—(choose type from Chapter 1).
5. **Corner Bead**—DUR-A-BEAD or ECONO Corner Reinforcement or No. 900 Corner Bead.
6. **Fasteners**—USG Brand Screws 1″ Type S, 1¼″ Type W.
7. **Joint Treatment**—Select a U.S.G. Joint System (choose from Chapter 1).
8. **USG Z-Furring Channel.**

installation with z-furring channel

Starting at an exterior corner, position a strip of rigid insulation 3″ max. width vertically against wall surface. Hold insulation in place with a USG Z-Furring Channel erected vertically, placed with narrow flange against wall and attached to wall with concrete stub nails or power-driven fasteners, spaced 24″ o.c. max. Position next 24″-wide insulation panel so that it abuts attached furring member and hold in place with next furring channel. On wall adjacent to starting corner, position last furring channel with wide flange against wall (see details).

On interior corners, attach USG Z-Furring Channel with web 1″ from abutting wall. Insert edge of a 12″-wide strip of insulation into the 1″ recess formed by the wall and furring channel. Secure other edge of panel with another length of Z-Furring Channel. Attach with fasteners driven through narrow flange. Continue application with 24″-wide panels.

Apply gypsum panels (vertically) (horizontally). Position all edges over furring channels in vertical application; all ends over framing in horizontal application with joints staggered in successive courses. Fit ends and edges closely, but not forced together. Fasten panels to channels with 1″ Type S screws spaced 12″ o.c.

installation with adhesive

Preparation—Cut mortar joints on surface of unit masonry to which insulation is to be bonded flush with masonry to provide an even surface. The wall surface should be plumb, true to dimensions, and clean. Hose, sweep and wipe down old or dirty masonry to remove loose material. Remove form mark protrusions and form-release agents from poured or precast concrete. Pockets or holes greater than 4″ in diameter and ⅛″ deep must be filled with mortar.

Prior to installation, attach wood nailer strips by mechanical means to the wall surface at base and wall-ceiling junctions around window and door openings, and wherever required for subsequent attachment of moldings, trim, casings, base, cabinets, heavy draperies, or other heavy wall fixtures. These nailers may also be used to receive temporary mechanical fasteners to aid in positioning the gypsum panels until the adhesive has set.

Insulation Application—Apply DURABOND 500 Adhesive in strips in center and along both edges of insulation panel. Use notched metal spreader having four ¼″x¼″ notches spaced 2″ o.c. Do not apply more adhesive than can be covered in 30 minutes.

Install insulation horizontally to wall surface, butt all edges tightly and stagger all vertical joints. Apply firm hand pressure over board surface to effect bond and level board as required. Slight vertical/lateral agitation of insulation helps in placement.

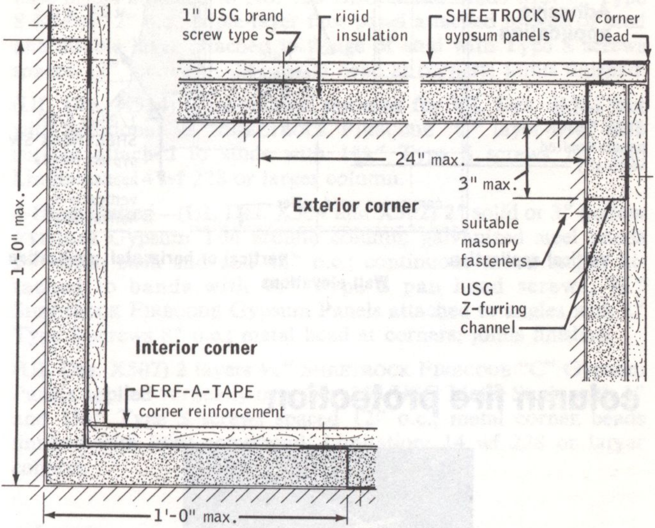
Gypsum Panel Application—A minimum of 24 hours after insulation has been installed, bond SHEETROCK face panels directly on the insulation using DURABOND 500 Adhesive.

Cut floor-to-ceiling height panels for vertical application. Allow for a continuous clearance (⅛″ to ¼″) at the floor. Apply adhesive to back of panel in strips at center of panel and along both edges. Use spreader having four ¼″x¼″ notches spaced 2″ o.c. Place gypsum panels on insulation within 30 minutes after adhesive is applied and impact panel 16″ o.c. over entire surface. Attach panels to all nailers with 1¼″ Type W screws spaced 16″ o.c.

Finishing—After adhesive is well set (24 hours min.), forming a firm bond between the insulation and the panels, finish panels in the conventional manner. Tape and treat joints their full length including areas above suspended ceilings and under base and trim around openings.

Mechanical application details

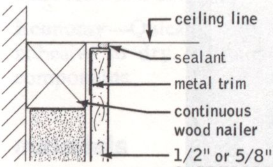
wall plan sections



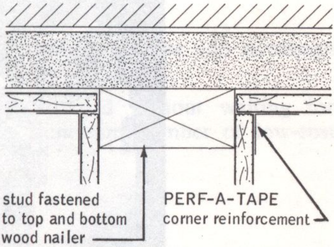
Exterior corner

Interior corner

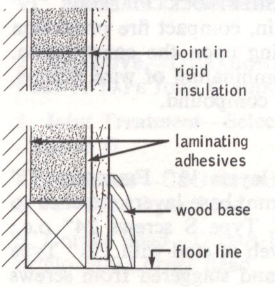
Adhesive application details



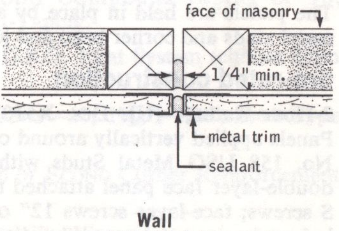
Ceiling attachment



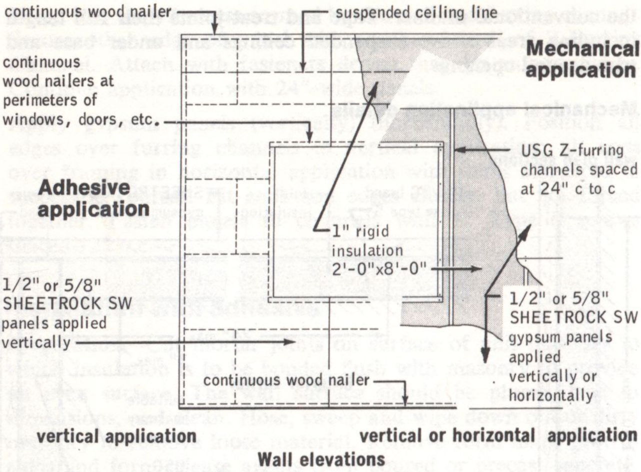
Partition wall intersection



Floor attachment

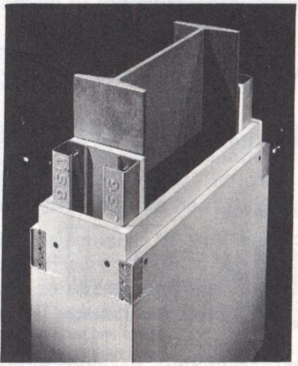


Wall control joint


continuous wood nailer
suspended ceiling line
Mechanical application
continuous wood nailers at perimeters of windows, doors, etc.
USG Z-furring channels spaced at 24" c to c
Adhesive application
1" rigid insulation 2'-0"x8'-0"
1/2" or 5/8" SHEETROCK SW panels applied vertically
1/2" or 5/8" SHEETROCK SW gypsum panels applied vertically or horizontally
continuous wood nailer
vertical application
vertical or horizontal application

Wall elevations

column fire protection



Steel column fire protection with SHEETROCK FIRECODE "C" Gypsum Panels offers lightweight, thin, compact fire protection of two, three or four hours depending upon the construction. The panels are held in place by a combination of wire, screws, metal studs and corner bead and joint compound.

fire-rated construction

2-Hour Rating—(UL Des. X518) 2 layers ½″ FIRECODE "C" Panels applied vertically around column; base layers attached to No. 158 USG Metal Studs with 1″ Type S screws 24″ o.c.; double-layer face panel attached to web of stud with 1⅝″ Type S screws; face-layer screws 12″ o.c. and staggered from screws in base layer; metal corner bead at all corners; joints finished.

(UL Des. X521) Single-layer ½″ SHEETROCK FIRECODE "C" Gypsum Panels applied vertically over No. 158 USG Metal Studs with 1″ Type S screws spaced 12″ o.c.; metal corner bead, joints finished. Limitation: 14 wf 228 or larger column.

3-Hour Rating—(UL Des. X515) 3 layers ½″ SHEETROCK FIRECODE "C" Gypsum Panels applied vertically around column; base layers attached to No. 158 USG Metal Studs with 1″ Type S screws 12″ o.c.; triple-layer face panel attached to web of stud and double layer attached to flange of stud with Type S screws spaced 12″ o.c. vertically; metal bead at corners; joints finished.

(UL Des. X514) Construction same as for UL Des. X521 but with additional ½″ SHEETROCK FIRECODE "C" layer over web surface attached to studs with 1⅝″ Type S screws 12″ o.c. Limitation: 14 wf 228 or larger column.

4-Hour Rating—(UL Des. X504 and X502) 2″ solid or 3″ hollow PYROBAR Gypsum Tile around column; galvanized steel bands 24″ from each end and 48″ o.c.; continuous metal angles attached to bands with ⅜″ Type S pan head screws; ⅝″ SHEETROCK FIRECODE Gypsum Panels attached to angles with 1″ Type S screws 8″ o.c.; metal bead at corners; joints finished.

(UL Des. X507) 2 layers ½″ SHEETROCK FIRECODE "C" Gypsum Panels applied vertically over No. 158 USG Metal Studs with 1″ and 1⅝″ Type S screws spaced 12″ o.c.; metal corner beads finished with joint compound. Limitation: 14 wf 228 or larger column.

advantages

Fire Resistance—up to 4 hours.

Lightweight—These thin lightweight assemblies add minimum dead load and save floor area.

Economy—Quickly and easily installed without waiting for adhesive to dry. Systems use a minimum number of low-cost components.

materials

1. **Gypsum Panels**—⅝″ thick, 48″ wide SHEETROCK FIRECODE; ½″ SHEETROCK FIRECODE "C" Gypsum Panels—lengths as required.
2. **Adhesive**—DURABOND Joint Compound-Taping or 90; PERF-A-TAPE Joint Compound-Taping.
3. **Joint Treatment**—Select a U.S.G. Joint System (choose from Chapter 1).
4. **Fasteners**—USG Brand Screws—1″, 1⁵⁄₁₆″, 1⅝″, 2¼″ Type S, ⅜″ Type S pan head.
5. **Corner Bead**—DUR-A-BEAD or ECONO Corner Reinforcement or No. 900 Corner Bead.
6. **Tie Wire**—18-ga. Galvanized Tie Wire.

7. **USG Metal Studs**—No. 158 (1⅝″).
8. **PYROBAR Gypsum Partition Tile** (2″ Solid) (3″ Hollow).
9. **RED TOP Partition Tile Cement.**
10. Clean, sharp sand complying with ASTM C35 (not available from U.S.G.)
11. USG 1⅜″x⅞″x24 ga. Galvanized Metal Angles.
12. 2″x26-ga. galv. steel straps (not available from U.S.G.).

installation

2-Hour Rating—(UL Des. X518)—Attach ½″ SHEETROCK FIRECODE "C" inner layer to No. 158 Metal Studs with 1″ Type S screws spaced 24″ o.c. Place assembly with gypsum panel adjacent to column flange. Erect another gypsum panel vertically around column. Attach base layer panels to studs with 1″ Type S screws 24″ o.c.; face layer panels 12″ o.c. Apply second layer to web face side of column and attach through first layer to web of studs with 1⅝″ Type S screws 12″ o.c. and staggered from screws in first layer. Screw-attach ECONO Corner Bead vertically at all corners and finish over trim with joint compound as described in Chapter 2.

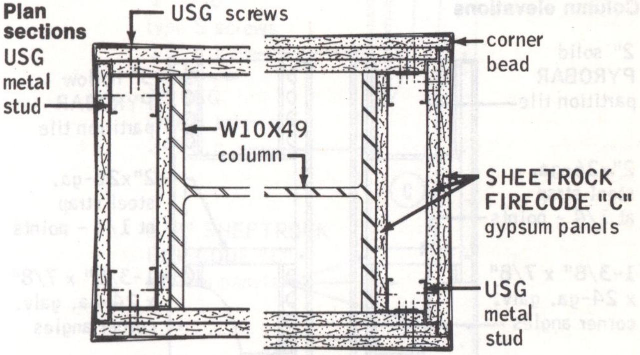
2-Hour Rating—(UL Des. X521)—Apply ½″ SHEETROCK FIRECODE "C" Gypsum Panels vertically over No. 158 Metal Studs positioned at column corners. Attach panels to studs with 1″ Type S screws spaced 12″ o.c. Apply corner bead at all corners and finish with joint compound.

3-Hour Rating—(UL Des. X515)—Attach inner layer ½″ SHEETROCK FIRECODE "C" Gypsum Panels to No. 158 Metal Studs with 1″ Type S screws spaced 12″ o.c. and place assembly with gypsum panel next to column flange. Install two additional layers to stud flange and three additional layers to stud web face side of column. Fasten base layers with 1″ Type S screws, middle layers with 1⅝″ screws and face layers with 2¼″ screws. Space all screws 12″ o.c. vertically. Apply corner bead at all corners and finish with joint compound.

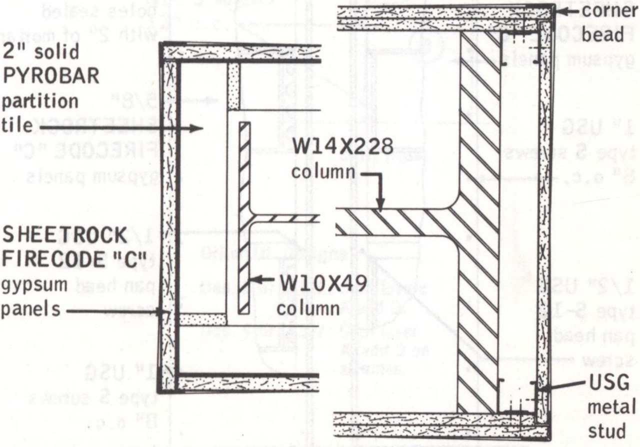
3-Hour Rating—(UL Des. X514)—Apply ½″ SHEETROCK FIRECODE "C" Gypsum Panels vertically over No. 158 Metal Studs positioned at column corners. Attach panels to studs with 1″ Type S screws spaced 12″ o.c. Install additional gypsum panel layer over web surface and attach to studs with 1⅝″ Type S screws spaced 12″ o.c. Apply corner bead at all corners and finish with joint compound.

4-Hour Rating—Lay PYROBAR Gypsum Tile plumb and true around columns using mortar mixed in proportions of 1 part Partition Tile Cement to 3 parts sand, by weight. Do not retemper mortar. After rough plumbing and wiring is in, place the first course with core holes horizontal by bedding mortar to a true and straight line. Set tile to provide ½″ minimum clearance from the edges and faces of all columns. Lay succeeding courses in ½″ thick full mortar bed uniformly level in each course. Stagger vertical joints and interlock tile at corners. Cut all joints flush. Use no broken tile. Slush chinks and crevices full with mortar. Cut top tile obliquely and wedge in place at ceiling. Slush joints between tile and ceiling full with mortar. Do not chase out Pyrobar for conduit or other piping. Seal exposed core holes with at least 2″ of mortar.

Install perimeter straps of 2″x26-ga. galvanized steel horizontally around Pyrobar Tile no more than 24″ from floor and ceiling and not to exceed 48″ o.c. Secure strap ends with ⅜″ Type S pan head screws. Place 1⅜″x⅞″x24-ga. galvanized metal angles cut to ½″ less than floor-to-ceiling height over the perimeter straps at each corner and secure to each perimeter strap with ⅜″ Type S pan head screws driven in each angle flange. Install ⅝″ Sheetrock Firecode "C" Gypsum Panels over and secure to corner angles with 1″ Type S screws spaced 8″ o.c. Finish over trim with joint compound as directed in Chapter 2.

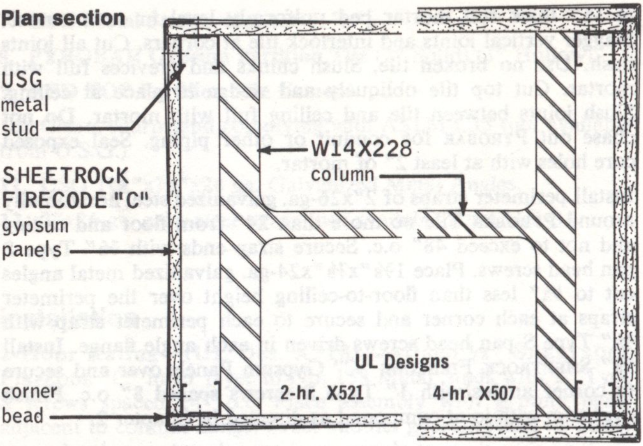


UL Designs **2-hr. X518** **3-hr. X515**

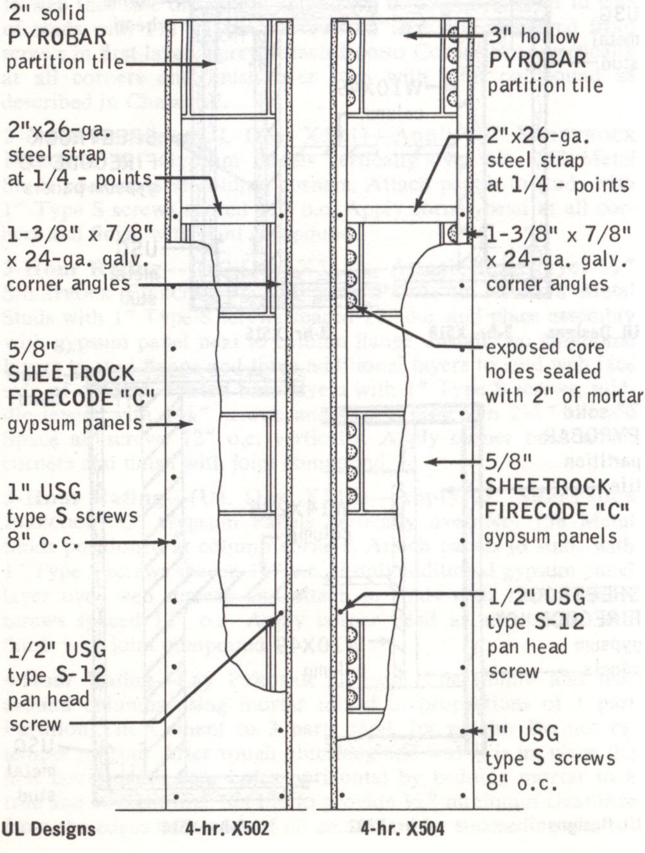

corner bead
2" solid PYROBAR partition tile
W14X228 column
SHEETROCK FIRECODE "C" gypsum panels
W10X49 column
USG metal stud

UL Designs **4-hr. X502** **3-hr. X514**

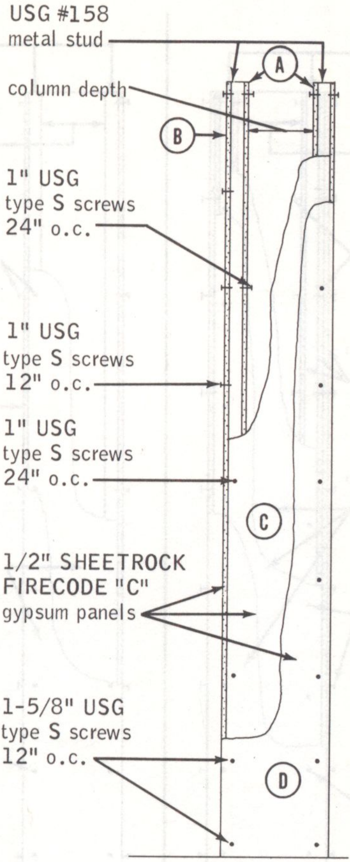
Plan section



Column elevations


2" solid PYROBAR partition tile
2"x26-ga. steel strap at 1/4 - points
1-3/8" x 7/8" x 24-ga. galv. corner angles
5/8" SHEETROCK FIRECODE "C" gypsum panels
1" USG type S screws 8" o.c.
1/2" USG type S-12 pan head screw
3" hollow PYROBAR partition tile
2"x26-ga. steel strap at 1/4 - points
1-3/8" x 7/8" x 24-ga. galv. corner angles
exposed core holes sealed with 2" of mortar
5/8" SHEETROCK FIRECODE "C" gypsum panels
1/2" USG type S-12 pan head screw
1" USG type S screws 8" o.c.
UL Designs
4-hr. X502
4-hr. X504

Column elevation



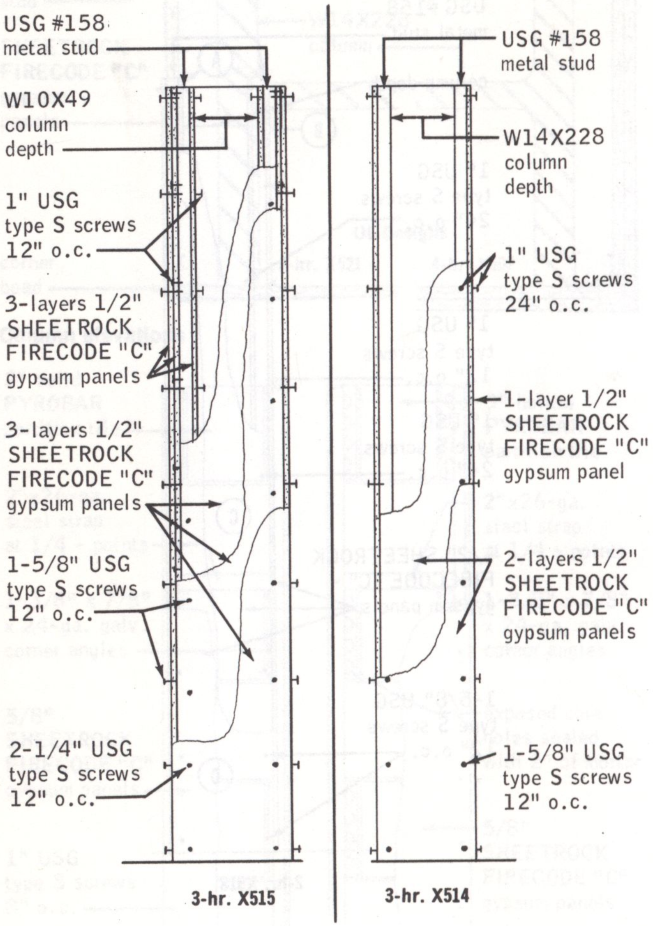
2-hr. X518

Other UL Designs

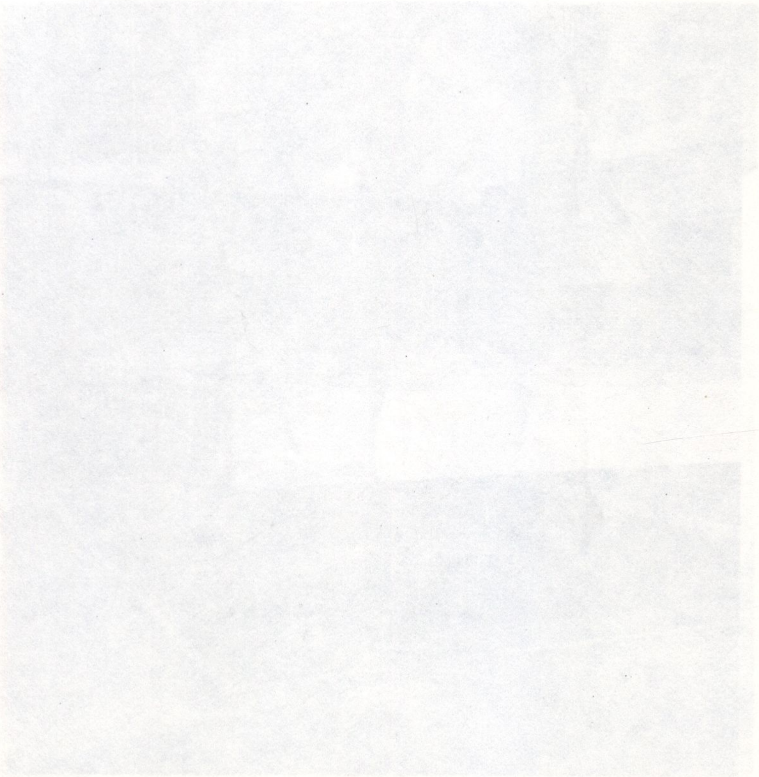
Des. 2-hr. X521: Omit layers A and D

Des. 4-hr. X507: Omit layer A, add D on all sides.

Column elevations

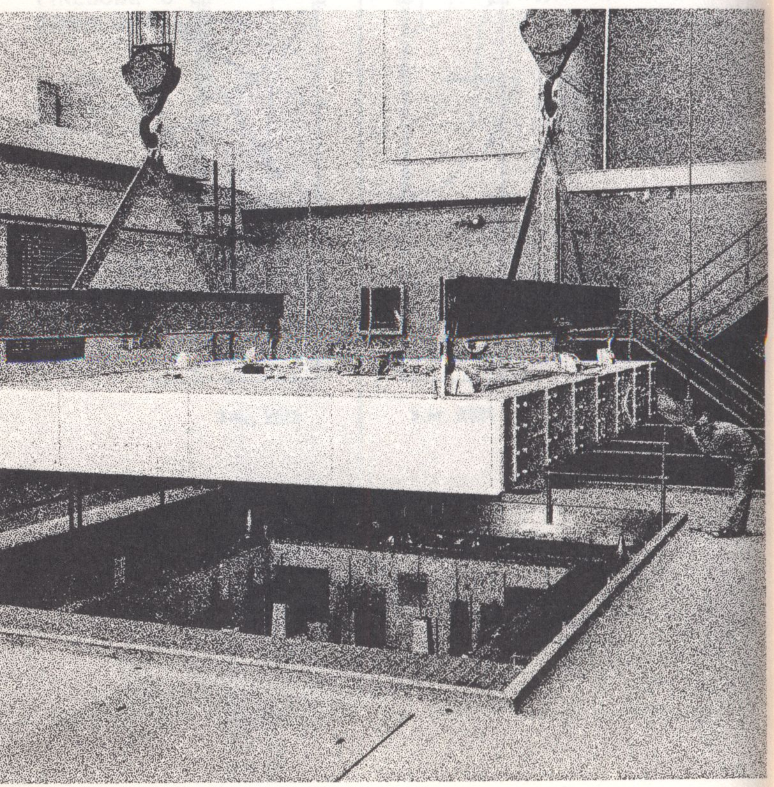


page
Fire and Sound Test Procedure 220
FHA Standards 221
Design For Better Performance 223
Selector Guide 225
SYSTEM RATINGS
Wood Stud Partitions 227
Metal Stud Partitions 231
Solid Vent Shaft 236
Wood Joist Ceilings 239
Bar Joist Ceilings 241
Steel Column Fireproofing 245
Beam Fireproofing 251
[illegible] DATA 252
Sound Transmission Loss Tables 252
Limiting Heights Partitions 258
Framing Member Spacing 259
Fasten[illegible]
Racking Resistance— Sheathing [illegible]



chapter 4

fire and sound test data

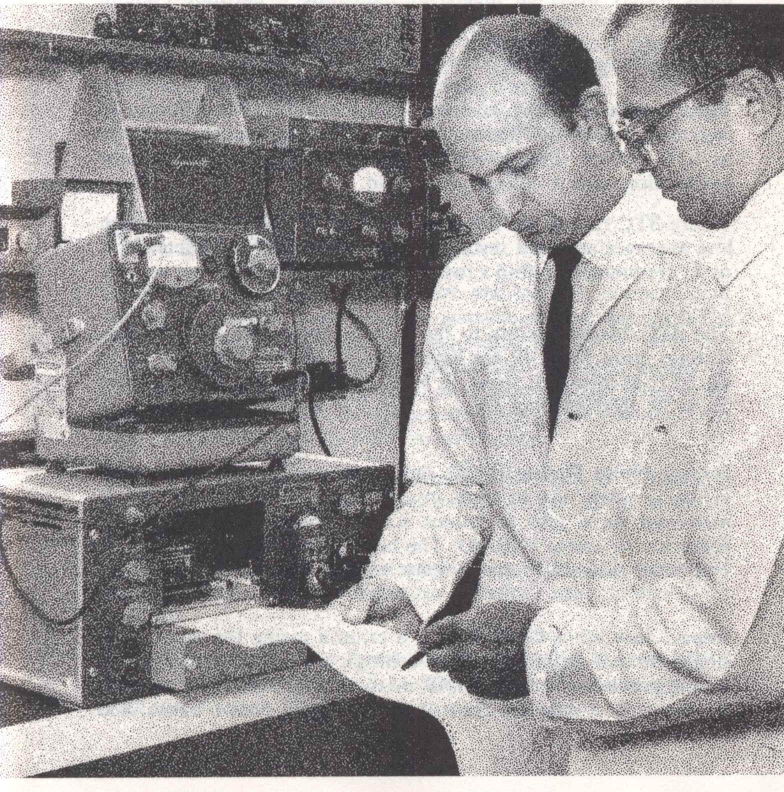


page
Fire and Sound Test Procedure 220
FHA Standards 221
Design for Better Performance 225
Selector Guide 225

SYSTEM RATINGS

Wood Stud Partitions 227
Metal Stud Partitions 232
Solid Vent Shaft 236
Wood Joist Ceilings 236
Bar Joist Ceilings 241
Steel Column Fireproofing 245
Beam Fireproofing 251

page
PHYSICAL TEST DATA 252
Sound Transmission Loss Tables 252
Limiting Heights, Partitions 256
Framing Member Spacing 258
Fastener Loading 259
Racking Resistance—Sheathing 259



fire and sound tests

Laboratory test data are used to compare, specify and select materials and constructions, and frequently to secure code or agency acceptance. Fire and sound ratings are assigned on the basis of performance shown in standard laboratory testing procedures. Laboratory data are often validated by subsequent field tests. Fire and sound ratings are important in evaluating and qualifying gypsum drywall partitions, floor-ceiling assemblies, and column fireproofing enclosures.

A **fire-resistance rating** denotes the length of time a given assembly can resist passage of intense heat and flames while supporting the imposed design loads. *Fire ratings are correlated with all components of a given assembly—not with the ceiling or partition membrane alone.*

The fire tests referred to in the following tables for 2″ nominal width wood joists and studs are based on an actual width of 1⅝″ rather than the 1½″ "dry" lumber marketed by several large manufacturers.

The **Sound Transmission Class (STC)** rating has become the most widely accepted means of indicating a partition's sound resistance–the result of comparing the sound transmission loss of a tested assembly with a "standard contour" of known sound loss performance.

Tests conducted using 11 frequencies (ASTM E90-61T) or 16 frequencies (E90-66T) are matched to standard contours known as STC curves. This procedure brings tests made with either designation into a comparative ratio.

Where STC ratings are not available, "db" (decibel) transmission loss averages are used resulting from sound tests conducted at 9 or 11 frequencies within a range of 125 to 4,000 cycles per second.

The **STC Median** refers to the standardization of STC ratings. Ratings from 38 to 42 are listed as STC Median 40; from 43 to 47, STC Median 45; from 48 to 52, STC Median 50; and from 53 to 57, STC Median 55.

Impact Noise Rating (INR) designates the ability of a floor-ceiling construction to resist impact sound transmission. INR is measured on a plus or minus scale in relation to a standard performance curve INR=O. The higher the positive number the better the assembly resists impact sound transmission.

Impact Insulation Class (IIC) is a criteria rating for reporting a single-number rating for floor-ceilings, and a slight change in testing procedure from the INR method. Test equipment remains the same. Test data are recorded at one-third octave bands, and the criteria curve is slightly changed. A rule of thumb which can be used is to add 51 to current INR ratings. The IIC single-number rating eliminates confusion of the plus and minus number ratings.

United States Gypsum leads the industry in documentation of the performance of its drywall systems by recognized testing laboratories–fire ratings ranging up to 2 hours for partitions, three hours for ceilings, 4 hours for column fireproofing; STC values as high as 60. In the test listings on the following pages, laboratories are identified at the end of each description as part of the pertinent test references. They are noted by abbreviation as follows:

BMS and NBS—National Bureau of Standards
UL—Underwriters' Laboratories, Inc.
OSU—Ohio State University
U of C—University of California
TL and IN—Riverbank Acoustical Laboratories
G&H—Geiger & Hamme Laboratory
CK—Cedar Knolls Acoustical Laboratories
BBN—Bolt, Beranek & Newman
GA—Gypsum Association
IBI—Insulation Board Institute
KSO—Kenward S. Oliphant
USG—United States Gypsum

In comparing any two sets of test data, one must be certain they were obtained under circumstances and by test procedures that were identical or nearly identical. Particularly in the case of acoustical laboratories, test methods are subject to change. This can necessitate the use of a correction factor for tests conducted before or after a certain date.

FHA standards

The Federal Housing Administration and leading mortgage and investment companies now include acoustic control standards for partitions in their mortgage commitments. These standards are shown on the next three pages. Definitions of three grades of acoustic environment are given to determine suitable criteria for the wide range of urban developments, geographic locations and other factors involved in FHA requirements.

Grade I—suburban residential areas which might be considered "quiet" locations, with nighttime exterior noise levels at about 35-40 db.

Grade II—suburban and residential urban areas with "average" noise environment, with nighttime exterior noise levels about 40-45 db.

Grade III—minimal recommendations, applicable in some urban areas considered as "noisy" locations, with nighttime exterior noise levels about 55 db or higher.

Partitions Sound Transmission Limitations Within Dwelling Units

Location of Partition	Grade I STC	Grade II STC	Grade III STC
Bedroom to Bedroom (1, 2)	48	44	40
Living room to Bedroom (1, 2)	50	46	42
Bathroom to Bedroom (1, 2, 3)	52	48	45
Kitchen to Bedroom (1, 2, 3)	52	48	45
Bathroom to Living room (2, 3)	52	48	45

1. Closets may be used as "buffer" zones, providing unlouvered doors are used.

2. Doors leading to bedrooms and bathrooms preferably should be of solid-core construction and gasketed to assure a comfortable degree of privacy.

3. Plumbing fixtures and appliances must be properly isolated as set forth in the U.S. Department of Housing & Urban Development "Airborne, Impact, and Structure Borne Noise Control in Multifamily Dwellings."

Partitions Sound Transmission Limitations Between Dwelling Units

Location of Partition		Grade I	Grade II	Grade III
Apt. A	Apt. B	STC	STC	STC
Bedroom	to Bedroom	55	52	48
Living room	to Bedroom (1, 2)	57	54	50
Kitchen (3)	to Bedroom (1, 2)	58	55	52
Bathroom	to Bedroom (1, 2)	59	56	52
Corridor	to Bedroom (2, 4)	55	52	48
Living room	to Living room	55	52	48
Kitchen (3)	to Living room (1, 2)	55	52	48
Bathroom	to Living room (1)	57	54	50
Corridor	to Living room (2, 4, 5)	55	52	48
Kitchen	to Kitchen (6, 7)	52	50	46
Bathroom	to Kitchen (1, 7)	55	52	48
Corridor	to Kitchen (2, 4, 5)	55	52	48
Bathroom	to Bathroom (7)	52	50	46
Corridor	to Bathroom (2, 4)	50	48	46

1. The most desirable plan would have the dwelling unit partition separating spaces with equivalent functions, e.g., living room opposite living room, etc.; however, when this arrangement is not feasible, the partition must have greater sound-insulating properties.

2. Whenever a partition wall might serve to separate several functional spaces, the highest criterion must prevail.

3. Or dining, or family, or recreation room.

4. Assumed there is no entrance door leading from corridor to living unit.

5. Solid-core entrance doors with proper gasketing must be used. The most desirable arrangement has entrance door leading from corridor to a partially enclosed vestibule or foyer in the living unit.

6. Double-wall construction is recommended to provide, in addition to airborne insulation, isolation from impact noises. Resilient attachment of surface materials may be used to achieve good sound insulation on party walls, providing wall cabinets are not mounted on them. Proper installation of cabinets and recommended isolation procedures for appliance installations must be followed.

7. Plumbing fixtures and appliances must be properly isolated as set forth in the U.S. Department of Housing & Urban Development "Airborne, Impact, and Structure Borne Noise Control in Multifamily Dwellings."

Floor-Ceiling Assemblies Sound Transmission Limitations Between Dwelling Units

Assembly Location		Grade I		Grade II		Grade III	
Apt. A	Apt. B	STC	IIC	STC	IIC	STC	IIC
Bedroom	above Bedroom	55	55	52	52	48	48
Living room	above Bedroom (1, 2)	57	60	54	57	50	53
Kitchen (3)	above Bedroom (1, 2, 4)	58	65	55	62	52	58
Family room	above Bedroom (1, 2, 5)	60	65	56	62	52	58
Corridor	above Bedroom (1, 2)	55	65	52	62	48	58
Bedroom	above Living room (6)	57	55	54	52	50	48
Living room	above Living room	55	55	52	52	48	48
Kitchen	above Living room (1, 2, 4)	55	60	52	57	48	53
Family room	above Living room (1, 2, 5)	58	62	54	60	52	56
Corridor	above Living room (1, 2)	55	60	52	57	48	53
Bedroom	above Kitchen (1, 4, 6)	58	52	55	50	52	46

continued on next page

1. The most desirable plan has floor-ceiling assembly separating spaces with equivalent functions such as living room above living room, etc. However, when this arrangement is not feasible the assembly must have greater acoustical insulating properties.

2. This arrangement requires greater impact sound insulation that the converse, where a sensitive area is above a less sensitive area.

3. Or dining, or family, or recreation room.

4. Plumbing fixtures and appliances must be isolated as set forth in "Airborne, Impact, and Structure Borne Noise Control in Multifamily Dwellings."

5. The airborne STC criteria in this table apply as well to vertical partitions between these two spaces.

6. This arrangement requires equivalent airborne sound insulation and perhaps less impact sound insulation than the converse.

7. Proper treatment of staircase halls and corridors must be followed as set forth in "Airborne, Impact, and Structure Borne Noise Control in Multifamily Dwellings."

Floor-Ceiling Assemblies—continued
Sound Transmission Limitations Between Dwelling Units

Assembly Location		Grade I		Grade II		Grade III	
Apt. A	Apt. B	STC	IIC	STC	IIC	STC	IIC
Living room	above Kitchen (1, 4, 6)	55	55	52	52	48	48
Kitchen	above Kitchen (4)	52	55	50	52	46	48
Bathroom	above Kitchen (1, 2, 4)	55	55	52	52	48	48
Family room	above Kitchen (1, 2, 4, 5)	55	60	52	58	48	54
Corridor	above Kitchen (1, 2, 4)	50	55	48	52	46	48
Bedroom	above Family room (1, 6)	60	50	56	48	52	46
Living room	above Family room (1, 6)	58	52	54	50	52	48
Kitchen	above Family room (1, 6)	55	55	52	52	48	50
Bathroom	above Bathroom (4)	52	52	50	50	48	48
Corridor	above Corridor (7)	50	50	48	48	46	46

1. The most desirable plan has floor-ceiling assembly separating spaces with equivalent functions such as living room above living room, etc. However, when this arrangement is not feasible the assembly must have greater acoustical insulating properties.

2. This arrangement requires greater impact sound insulation than the converse, where a sensitive area is above a less sensitive area.

3. Or dining, or family, or recreation room.

4. Plumbing fixtures and appliances must be isolated as set forth in "Airborne, Impact, and Structure Borne Noise Control in Multifamily Dwellings."

5. The airborne STC criteria in this table apply as well to vertical partitions between these two spaces.

6. This arrangement requires equivalent airborne sound insulation and perhaps less impact sound insulation than the converse.

7. Proper treatment of staircase halls and corridors must be followed as set forth in "Airborne, Impact, and Structure Borne Noise Control in Multifamily Dwellings."

designing for better performance

Usually the architect selects only a partition system which has been tested and achieved a high "STC" rating in the laboratory, and prepares corresponding details and specifications for the partition contractor. Unfortunately, the acoustical performance indicated by test can be lost between the architect's drawing board and the completed partition. This has been true in many projects.

U.S.G. research work has proven that a partition can be built in three different ways on-the-job, and that each produces a different acoustical value. They can be defined as:

(1) *Normal:* both the building structure and party walls are designed and built without considering acoustical performance.

(2) *Select:* the structure is, again, designed and built normally. But partitions are selected and built according to acoustical details used in the laboratory when the assembly was tested.

(3) *Pre-design:* the building structure is designed and constructed with special acoustical details to prevent sounds from flanking a partition. Most important of these details are provisions for proper perimeter relief, and caulking of openings and perimeter points.

The caulking used should be the resilient, non-hardening, non-skinning type to maintain a partition's sound resistance and to seal against sound leaks. Gasketing alone is not as effective.

See Chapter 2 for proper caulking procedures and details on isolation of adjoining surfaces required to prevent direct transmission of sound energy.

* * *

The Selector Guides on page 226 classify tested USG partition assemblies according to their fire and sound ratings and types of construction. The numerals in each column correspond to the "assembly numbers" listed in sequence starting on page 227.

Rated ceiling assemblies and column and beam fireproofing systems also are included in the tables.

Selector Guide—Sound-Rated Partitions

STC Medium	Assembly Nos. with— Wood Stud	Metal Stud
60	2	
55	8	17, 18, 23, 25
50	4, 6, 7, 9	19, 20, 24, 26, 27
45	5, 10, 12, 13	21, 28
40	11, 16	29, 30
35	14	

Selector Guide—Fire-Rated Partitions

Fire Rating	Assembly Nos. with— Wood Stud	Metal Stud
2 hrs.†	1, 2, 3, 4, 5	17, 18, 19, 20, 21, 22
1 hr.	6, 7, 8, 9, 10, 11, 12, 13, 14, 15	23, 24, 25, 26, 27, 28, 29, 30
45 min.	16	

†Also 2 hrs.: laminated gypsum solid vent shaft, No. 31.

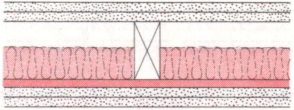
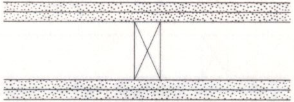
Selector Guide—Sound-Rated Ceilings

STC Median	IIC Median	Assembly Nos. with— Wood Joists	Bar Joists
60	70	54	—
55	55	43	—
55	45	44	—
55	—	—	56
50	70	41, 42	—
50	65	37	—
50	45	39, 40	—
50	35	46	—
50	30, 50, 70	—	58
50	—	32, 33	—
45	65	38	—
45	40	35, 36	—
45 (9-f)	—	—	60
40	60	50	—
40	55	48	—
40	30	47, 49	—
40	—	—	59
35	—	53	—

Selector Guide—Fire-Rated Ceilings

Fire Rating	Assembly Nos. with— Wood Joists	Bar Joists
3 hrs.	—	55
2 hrs.	32	56, 57, 58
1½ hrs.	33	59
1 hr.	34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52	—
45 min.	53	
Non-rated	54	60

2-hr.-rated wood stud partitions

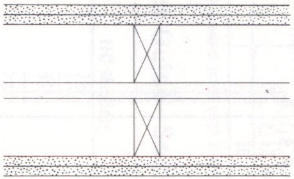
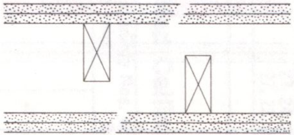
Assembly No.	STC Median	U.S.G. Height Limit, Ft.	Thickness, In.	Wt. per Sq. Ft., Lbs.	Cost Index	Construction Detail	Description
1	—	—	6⅝	13	194		2 layers ⅝″ SHEETROCK FIRECODE "C" gypsum panels ea side—2x4 16″ o.c.—2″ THERMAFIBER ins wool blkts—RC-1 chan one side spaced 24″ o.c.—panels screw att—opp side nail att—both base layers appl vert and face layers appl horiz—base layers perim caulked—joints fin—**T-4799-OSU (f)**
2	60	—	6⅛	12	188 176		Same as above except with ½″ SHEETROCK FIRECODE "C" panels and 3″ THERMAFIBER ins wool blkts—**est (f)—TL-67-239 (s)—TL-67-212 (s)**
3	—	—	6⅛	12	165		2 layers ⅝″ SHEETROCK FIRECODE or W/R FIRECODE "C" gypsum panels—2x4 16″ o.c.—base layer att with 6d nails 6″ o.c.—face layer lamin or nailed over base—joints exposed or fin—**UL Des U301 (4-2 hr) (f)**

Abbreviations: appl—applied; att—attached; atten—attenuation; betw—between; blkts—blankets; bd—board; clg—ceiling; cem ctd—cement coated; chan—channel; col—column; com—common; compd—compound; conc—concrete; contin—continuous; corebd—coreboard; cr—cold rolled; db—decibel; dbl—double; dead—deadening; Des—Design; dir—direct; ea—each; est—estimated; exp—exposed; f—fire; fin—finished; flr—floor; fur—furring; galv—galvanized; hex—hexagonal; horiz—horizontally; IIC—Impact Insulation Class; INR—Impact Noise Rating; ins—insulating; lamin—laminated; met—metal; min—mineral; N/A—not available; nom—nominal; opp—opposite; perim—perimeter; plywd—plywood; qtr—quarter; reinf—reinforced and reinforcement; resil—resilient; run—runner; sep—separate; separ—separated; s—sound; spec—special; stag—staggered; STC—Sound Transmission Class; stl—steel; sub flr—subfloor; susp—suspended; unfin—unfinished; vert—vertically; wd—wood; wt—weight.

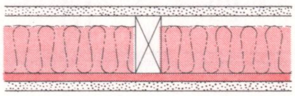
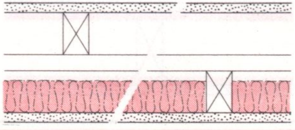
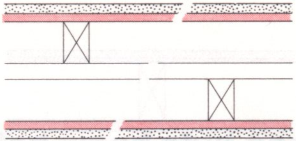
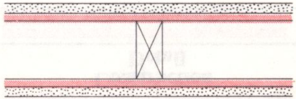
▨ Sound-deadening material.

🟥 Resilient or furring channels, or columns.

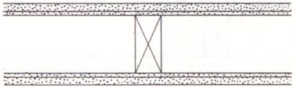
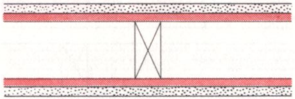
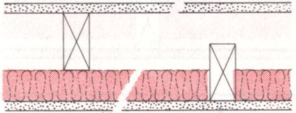
2-hr.-rated wood stud partitions—continued

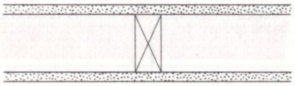
Assembly No.	STC Median	U.S.G. Height Limit, Ft.	Thickness, In.	Wt. per Sq. Ft., Lbs.	Cost Index	Construction Detail	Description
4	50	—	10¾	13	203		2 layers ⅝″ Sheetrock Firecode "C" gypsum panels—2 rows 2x4 16″ o.c. on sep plates 1″ apart—base layer att with 6d cem ctd nails 16″ o.c.—face layer att with 7d cem ctd nails 7″ o.c.—perim caulked—joints fin—est (f)—**TL-69-214 (s)—USG-710120 (with 3½″ wool in one cavity) (s)**
5	45	—	8⅛	13	194		2 layers ⅝″ Sheetrock Firecode "C" gypsum panels—2x4 stag studs 16″ o.c. on 2x6 com plate—base layer att with 6d cem ctd nails 6″ o.c.—face layer att with 8d cem ctd nails 8″ o.c.—perim caulked—joints fin—est (f)—**TL-69-211 (s)**

1-hr.-rated wood stud partitions

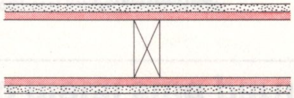
6	50	—	5⅜	7	136		Resil ⅝″ Sheetrock Firecode "C" gypsum panels—2x4 16″ or 24″ o.c.—3″ Thermafiber ins wool blkts betw studs—RC-1 chan one side spaced 24″ o.c.—panels att with 1″ Type S screws—opp side dir att with 1¼″ Type W screws—joints fin—perim caulked—**UL Des U311 (27-1 hr) (f)—USG-33-FT-G&H (s)**
7	50 50	—	7½	8	150		⅝″ Sheetrock Firecode gypsum panels—2 rows 2x3 stag studs 16″ o.c. on sep 2x3 plates 1″ apart—2″ Thermafiber ins wool blkts one side—panels att with 1¼″ Type W screws 16″ o.c.—joints fin—perim caulked—**est (f)—USG-106-FT-G&H (s) USG-155-FT-G&H (s)**
8	55	—	8½	9	175		⅝″ Sheetrock Firecode or W/R Firecode "C" gypsum panels—2 rows 2x3 stag studs on sep plates 1″ apart—2 layers ea side—base layer ½″ USG wd fiber sound dead bd att with 6d cem ctd nails—face layer att with 7d cem ctd nails—joints fin—perim caulked—**UL Des U308 (17-1 hr) (f)—USG-46-FT-G&H (s)**
9	50	—	5⅞	8	151		⅝″ Sheetrock Firecode gypsum panels—2x4 16″ o.c.—2 layers ea side—base layer ½″ USG wd fiber sound dead bd att with 5d cem ctd nails—face layer Sheetrock strip lamin—joints fin—perim caulked—**est (f)—IBI-20-FT-G&H (s)**

1-hr.-rated wood stud partitions—continued

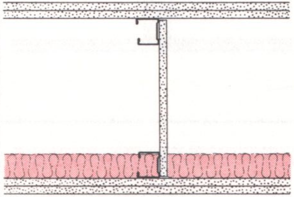
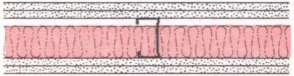
Assembly No.	STC Median	U.S.G. Height Limit, Ft.	Thickness, In.	Wt. per Sq. Ft., Lbs.	Cost Index	Construction Detail	Description
10	45 55	—	5⅛	8	153 168		½″ SHEETROCK FIRECODE "C" gypsum panels—2x4 16″ o.c.—base layer ¼″ SHEETROCK gypsum panels appl vert with 4d cem ctd nails—½″ panel face layer strip lamin—joints stag & fin—perim caulked—**est (f)—TL-69-52 (s)—USG-221-ST-G&H (⅝″ face panel, 1½″ wool) (s)**
11	40	—	5⅛	7	144		2 layers ⅜″ SHEETROCK gypsum panels lamin and nailed—2x4 16″ o.c.—joints fin—**T-118-48-OSU (f)—TL-57-14 (s)**
12	45	—	5⅞	7	136		Resil ⅝″ SHEETROCK FIRECODE gypsum panels—2x4 16″ o.c.—RC-1 chan both sides spaced horiz 24″ o.c. att with 6d nails—panels att with 1″ Type S screws—joints fin—perim caulked—**T-1396-OSU (f)—TL-60-52 (s)**
13	45	—	6⅞	8	150		⅝″ SHEETROCK FIRECODE "C" gypsum panels—2x4 stag studs 16″ o.c. on 2x6 com plate—panels att with 6d cem ctd nails 7″ o.c.—2″ THERMAFIBER ins wool blkts one side—joints fin—perim caulked—**est (f)—TL-69-213 (s)**

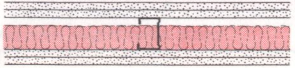
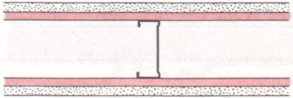
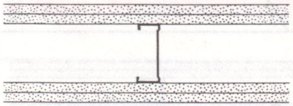
14	35	—	4⅞	7	107		⅝″ SHEETROCK FIRECODE or W/R FIRECODE "C" gypsum panels—2x4 16″ o.c.—panels att with 1⅞″ cem ctd nails 7″ o.c.—joints exp or fin—perim caulked—**UL Des U305 (5-1 hr) (f)—USG-30-FT-G & H (s)**
15	45	—	4⅞	7	107		Same as above except 24″ stud spacing and joints fin—**UL Des U314 (38-1 hr) (f)—BBN-700725 (with 3″ wool) (s)**

45-min.-rated wood stud partition

16	40	—	5⅝	7	162		½″ SHEETROCK gypsum panels—2x4 16″ o.c.—base layer ½″ USG wd fiber sound dead bd att with 1⅝″ cem ctd nails 12″ o.c.—face layer strip lamin and 2¼″ cem ctd nails 24″ o.c. into studs—**est (f)—IBI-5-FT-G&H (s)**

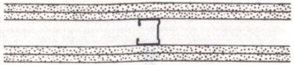
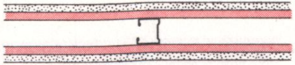
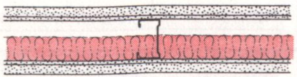
2-hr.-rated metal stud partitions

Assembly No.	STC Median	(1) U.S.G. Height Limit, Ft.	Thickness, In.	Wt. per Sq. Ft., Lbs.	Cost Index	Construction Detail	Description
17	55	16′-6″ (24″ limiting width)	12	11	188		Metal stud chase wall—2 layers ½″ SHEETROCK FIRECODE "C" gypsum panels ea side—1⅝″ USG studs 24″ o.c. in two rows spaced 6¾″ apart—½″ panel gussets spanning chase att at qtr points—1½″ THERMAFIBER sound atten blkts one side—panels appl vert and screw att—joints stag and fin—perim caulked—**est (f)—USG-134-FT-G&H (s)**
18	55	11′-6″ (2½″) 14′-9″ (3⅝″)	4½	10	164		2 layers ½″ SHEETROCK FIRECODE "C" gypsum panels ea side—2½″ or 3⅝″ USG studs 24″ o.c.—1″, 1½″ or 2″ THERMAFIBER sound atten blkts betw studs—panels appl vert and joints stag—base layer screw att—face layer strip lamin or screw att—joints fin—perim caulked—**UL Des U412 (28-2 hr) (f)—USG-114-FT-G&H (s)—KSO-109006-a (s)—CK-654-40 (screw att face layer) (s)**

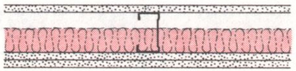
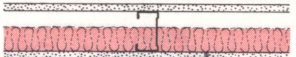
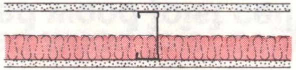
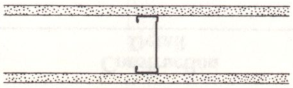
19	50	10′-3″	4	9	164		"Series 4" partition—2 layers ½″ SHEETROCK FIRECODE "C" gypsum panels ea side—2″ USG studs 24″ o.c.—panels appl vert and screw att—1½″ THERMAFIBER sound atten blkts—joints fin—perim caulked—**est (f)—TL-69-159 (s)—TL-69-155 (without wool) (s)**
20	50	14′-9″	5⅞	8	167		✓ ⅝″ SHEETROCK FIRECODE "C" panels—2 layers—3⅝″ USG studs 24″ o.c.—base layer ½″ USG min fiber sound dead bd ea side screw att—panel face layer lamin and screw att—joints stag and fin—perim caulked—**est (f)—USG-103-FT-G&H (s)—KS0-109006-b (s)**
21	45	11′-6″ (2½″) 14′-9″ (3⅝″)	5 6⅛	12	178		2 layers ⅝″ SHEETROCK FIRECODE gypsum panels plain or vinyl faced appl vert ea side—2½″ or 3⅝″ USG studs 24″ o.c.—base layer screw att—face layer lamin or screw att—joints fin or unfin—perim caulked—**UL Des U411 (11-2 hr) (f)—TL-60-113 (s)**
22	N/A	9′-3″	3⅝	9	149		2 layers ½″ SHEETROCK FIRECODE "C" gypsum panels—1⅝″ USG studs 24″ o.c.—2 layers ea side appl vert and screw att—joints fin—**U of C—6-15-65 (f)**

(1) Based on load of 5 psf; deflection limited to L/240. See pages 256-7 for additional limiting height details.

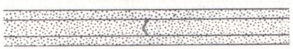
1-hr.-rated metal stud partitions

Assembly No.	STC Median	(1) U.S.G. Height Limit, Ft.	Thickness, In.	Wt. per Sq. Ft., Lbs.	Cost Index	Construction Detail	Description
23	55	9′-3″	3⅝	9	146 158		2 layers ½″ Sheetrock Firecode "C" gypsum panels—1⅝″ USG studs 24″ o.c.—2 layers ea side appl vert and screw att—joints fin—U of C—**9-21-64 (f)**—**CK-654-40 (2½″ studs, 1½″ wool) (s)**
24	50	9′-0″	3⅝	7	165	✓ 	½″ Sheetrock Firecode "C" gypsum panels appl vert over ½″ USG min fiber sound dead bd—1⅝″ USG studs 24″ o.c.—base layer appl vert and screw att—face layer strip lamin and screw att—joints stag and fin—perim caulked—**UL Des U407 (23-1 hr) (f)**—**USG-57-FT-G&H (s)**
25	55	11′-6″	4¼	7	160 156		⅝″ Sheetrock Firecode gypsum panels—2½″ USG studs 24″ o.c.—1½″ Thermafiber sound atten blkts—2 layers—base layer ¼″ Sheetrock panels screw att—⅝″ face layer screw att—joints fin—perim caulked—**est (f)**—**CK-684-14 (s)**—**CK-684-13 (½″ board) (s)**

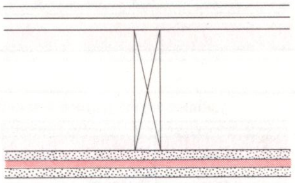
(1) Based on load of 5 psf; deflection limited to L/240. See pages 256-7 for additional limiting height details.

26	50	12′-3″	4	7	136		“Series 4” partition—½″ Sheetrock Firecode “C” gypsum panels—2½″ USG studs 24″ o.c. —single layer panels one side app vert and screw att—1½″ Thermafiber sound atten blkts one side—2 layers—panels opp side appl vert and screw att—joints stag and fin—perim caulked—**est (f)—TL-69-153 (s)—TL-69-148 (without wool) (s)—BBN-700726 (2⅝″ foil-faced wool) (s)**
27	50	15′-9″	3½	5	108	 Sound Test 3 5/8 DWS 1"SAB	½″ Sheetrock Firecode “C” gypsum panels —2½″ USG studs 24″ o.c.—1½″ Thermafiber sound atten blkts one side—single layer panels ea side appl vert and screw att—joints fin—perim caulked—**T-3362-OSU (f)—TL-65-158 (s)**
28	45	15′-0″	4	5	108		“Series 4” partition—½″ Sheetrock Firecode “C” gypsum panels—3″ USG studs 24″ o.c.—single layer panels ea side appl vert and screw att—1½″ Thermafiber sound atten blkts—joints fin—perim caulked—**est (f)—BBN-710310 (s)—TL-70-106 (s)**
29	40	15′-9″	4⅞	6	98		⅝″ Sheetrock Firecode gypsum panels—3⅝″ USG studs 24″ o.c.—single layer panels appl vert or horiz and screw att 12″ o.c.—joints fin—perim caulked—**T-1174-OSU (f)—GA-WP-45-1 hr (f)—USG-17-FT-G&H (s)**
30	40	9′-0″	2⅞	5	98		⅝″ Sheetrock Firecode gypsum panels—1⅝″ USG studs 24″ o.c.—panels appl vert and screw att 12″ o.c.—joints fin—perim caulked—**U of C—7-31-61 (f)—TL-64-29 (s)**

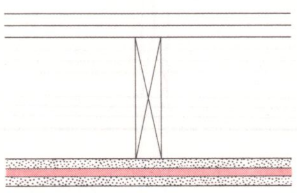
2-hr.-rated solid vent shaft

Assembly No.	STC Median	U.S.G. Height Limit, Ft.	Thickness, In.	Wt. per Sq. Ft., Lbs.	Cost Index	Construction Detail	Description
31	N/A	14′-0″ (12-ft. width between restraints)	2¼	9	111		⅝″ Sheetrock Firecode gypsum panel faces ea side over 1″ USG gypsum corebd—face layers lamin and screw att—joints stag and unfin—⅞″x1⅜″ angle run horiz at flr, clg and qtr points—**UL Des U505 (21-2 hr) (f)**

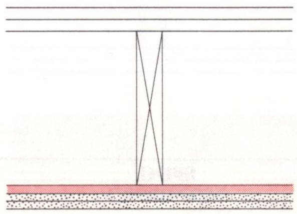
2-hr. rated wood joist ceilings

Assembly No.	STC Median	IIC Median	Wt. per Sq. Ft., Lbs. (Clg. Matls. Only)	Cost Index	Construction Detail	Description
32	50 (est)	—	5	89		Resil 2 layers ⅝″ Sheetrock Firecode "C" gypsum panels—1″ nom wd sub and fin flr —2x10 wd joists 16″ o.c.—RC-1 chan spaced 24″ o.c. screw att over base layer panels—face layer screw att to chan 12″ o.c.—joints fin—**UL Des L511 (272-2 hr) (f)—est (s)**

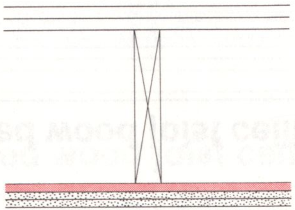
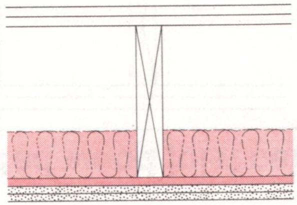
1½-hr.-rated wood joist ceilings

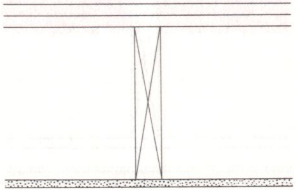
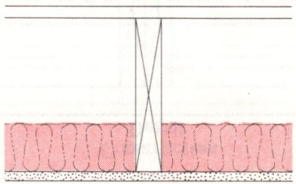
33	50 (est)	—	5	57		Resil 2 layers ½″ Sheetrock Firecode "C" gypsum panels—1″ nom wd sub and fin flr—2x10 wd joists 16″ o.c.—RC-1 chan spaced 24″ o.c. screw att over base layer panels—face layer screw att to chan 12″ o.c.—joints fin—**UL Des L510 (22-1½ hr) (f)—est (s)**

1-hr.-rated wood joist ceilings

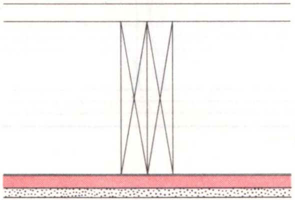
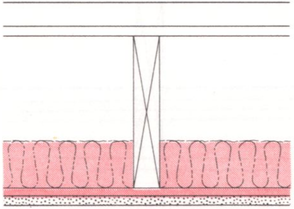
34	N/A	—	3	57		Resil ½″ Sheetrock Firecode "C" gypsum panels—1″ nom plywd **&** Mastical underlayment compd or wd sub and fin flr—2x10 wd joists 16″ o.c.—RC-1 chan spaced 24″ o.c.—panels att with 1″ Type S screws—joints fin—**UL Des L514 (41-1 hr) (f)—N/A (s)**
35	45	40	3	57		Resil ⅝″ Sheetrock gypsum panels—1¼″ nom wd sub and fin flr—2x10 wd joists 16″ o.c.—RC-1 chan screw att to joists—panels att with 1″ Type S screws—joints fin—**est (f)—CK-6412-10 (s)**

1-hr.-rated wood joist ceilings—continued

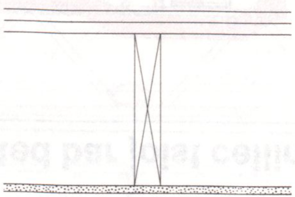
Assembly No.	STC Median	IIC Median	Wt. per Sq. Ft., Lbs.	Cost Index	Construction Detail	Description
36	45	40	3	57		Same as No. 35 except ½″ Sheetrock Firecode "C" panels.—**est (f)—CK-6512-6 (s)**
37	50	65	3	57		Same as No. 35 plus carpet and pad atop flr—**est (f)—CK-6412-9 (s)**
38	45	65	3	57		Same as above except ½″ Sheetrock Firecode "C" panels—**est (f)—CK-6512-7 (s)**
39	50	45	3	69		Same as No. 35 plus 3″ Thermafiber ins wool blkts in joist space—**est (f)—CK-6412-3 (s)**
40	50	45	3	69		Same as above except ½″ Sheetrock Firecode "C" panels—**est (f)—CK-6512-9 (s)**
41	50	70	3	69		Same as No. 39 plus carpet and pad atop flr—**est (f)—CK-6412-4 (s)**
42	50	70	3	69		Same as above except ½″ Sheetrock Firecode "C" panels—**est (f)—CK-6512-8 (s)**
43	55	55	3	69		Resil ½″ Sheetrock gypsum panels—⅝″ Mastical underlayment compd over ⅝″ plywd subflr—2x10 wd joists 16″ o.c.—RC-1 chan spaced 24″ o.c.—3″ Thermafiber ins wool blkts betw joists—panels att with 1″ Type S screws—joints fin—**est (f)—BBN-670601 (s)—BBN-670602 (s)**
44	55	45	3	57		Same as above except without wool—**est (f)—BBN-670705 (s)—BBN-670706 (s)**

45	—	—	3	44		½″ SHEETROCK FIRECODE "C" gypsum panels —1″ nom plywd & MASTICAL underlayment compd or wd sub and fin flr—2x10 wd joists 16″ o.c.—panels att with 5d cem ctd nails 6″ o.c.—joints fin—**UL Des L512 (42-1 hr) (f)—NBS-77 P-716 (wd flr) (s)**
46	50	35	3	44		Same as above except 1¼″ thick MASTICAL underlayment—**UL Des L512 (42-1 hr) (f)—BBN-671007 (s)—BBN-671008 (s)**
47	40	30	3	45		⅝″ SHEETROCK FIRECODE gypsum panels—1″ nom wd sub and fin flr—2x10 wd joists 16″ o.c.—panels att with 6d nails 6″ o.c.—joints fin—**UL Des L501 (1-1 hr) (f)—CK-6412-7 (s)**
48	40	55	3	45		Same as above plus carpet and pad atop flr —**UL Des L501 (1-1 hr) (f)—CK-6412-8 (s)**
49	40	30	3	57		⅝″ SHEETROCK gypsum panels—1″ nom wd sub and fin flr—2x10 wd joists 16″ o.c.—3″ THERMAFIBER ins wool blkts betw joists—panels att with 6d nails 6″ o.c.—joints fin—**est (f)—CK-6412-6 (s)**
50	40	60	3	57		Same as No. 49 plus carpet and pad atop flr —**est (f)—CK-6412-5 (s)**

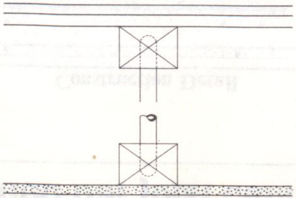
1-hr.-rated wood joist ceilings—continued

Assembly No.	STC Median	IIC Median	Wt. per Sq. Ft., Lbs. (Clg. Matls. Only)	Cost Index	Construction Detail	Description
51	—	—	3	58		⅝″ SHEETROCK FIRECODE gypsum panels—American Plywood Assn 2-4-1 flr—4x10 wd joists 48″ o.c.—USG met fur chan spaced 24″ o.c.—panels screw att with 1″ Type S screws—joints fin—**UL Des L508 (28-1 hr) (f)—N/A (s)**
52	—	—	3	65		Resil ⅝″ SHEETROCK FIRECODE "C" gypsum panels—1⅝″ perlite-sand conc over ⅝″ plywd sub flr—2x10 wd joists 16″ o.c.—3″ glass fiber batts betw joists—RC-1 chan screw att to joists—panels att with 1″ type S screws—joints fin—**UL Des L516 (62-1hr) (f)**

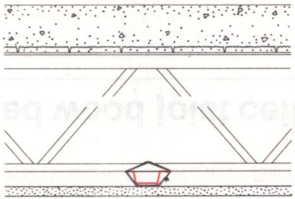
45-min.-rated wood joist ceiling

53	35	—	3	43		½″ SHEETROCK FIRECODE gypsum panels—1″ nom wd sub and fin flr—2x10 wd joists 16″ o.c.—panels att with 5d cem ctd nails 6″ o.c.—joints fin—**UL Des (1-45 min) (f)—NBS-77-P-716 (s)**

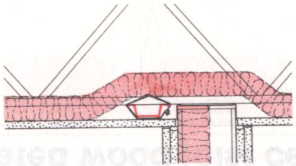
Non-rated wood joist ceiling

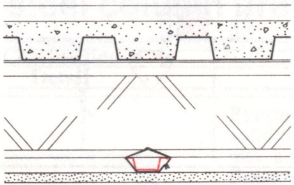
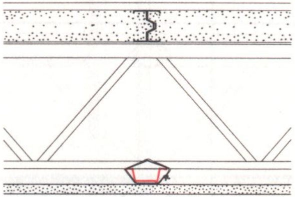
54	60	70	3	69		Resil ⅝″ SHEETROCK FIRECODE "C" gypsum panels—¾″ plywd subflr & ⅝″ MASTICAL underlayment compd—14″ open web wd joists 24″ o.c.—2″ THERMAFIBER ins wool blkts betw joists—RC-1 chan spaced 24″ o.c. att to joists with 1¼″ Type W screws—panels att with 1″ Type S screws 12″ o.c.—joints fin—carpet and pad atop flr—**N/A (f)—TL-70-9 (s)—IN-70-4 (s)**

3-hr.-rated bar joist ceiling

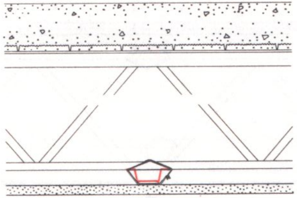
Assembly No.	STC Median	IIC Median	Wt. per Sq. Ft., Lbs. (Clg. Matls. Only)	Cost Index	Construction Detail	Description
55	—	—	3	58		⅝″ Sheetrock Firecode "C" gypsum panels—USG met fur chan 24″ o.c.—panels att with 1″ Type S screws 12″ o.c.—joints exp or fin—3″ conc on riblath over bar joist—**UL Des G512 (beam 3 hrs) (82-3 hr) (f)—N/A (s)**

2-hr.-rated bar joist ceilings

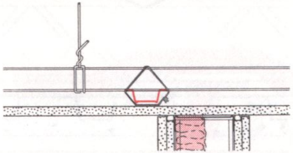
Assembly No.	STC Median	IIC Median	Wt. per Sq. Ft., Lbs. (Clg. Matls. Only)	Cost Index	Construction Detail	Description
56	55 up & over	—	3	57		½″ Sheetrock Firecode "C" gypsum panels—furred or susp USG met fur chan 24″ o.c.—panels att with 1″ Type S screws 12″ o.c.—joints exp or fin—2½″ conc deck on riblath over bar joist—**UL Des G515 (beam 2 hrs) (221-2 hr.) (f)—USG-189-FT-G & H (s)**

57	—	—	3	58		⅝″ Sheetrock Firecode "C" gypsum panels—1″ Mastical underlayment compd—furred or susp USG met fur chan 24″ o.c.—panels att with 1″ Type S screws 12″ o.c.—joints exp or fin—22-ga type B stl deck over bar joist 48″ o.c.—**UL Des G506 (beam 2 hrs) (308-2 hr) (f) N/A (s)**
58	50	30 50 70	17	194		USG Floor Plank System—½″ Mastical underlayment compd—(1) no flr fin (2) foam-backed vinyl flr covering (3) carpet and pad atop flr—2″ USG gypsum flr plank welded to bar joist 48″ o.c.—USG met fur chan 24″ o.c. wire tied to joist—⅝″ Sheetrock Firecode "C" gypsum panels screw att 12″ o.c.—joints exp or fin—**UL Des G516 (beam 2 hrs) (266-2 hr) (f)—BBN-681014 (s) (1) BBN-681015 (2) BBN-681016 (3) BBN-681017 (s)**

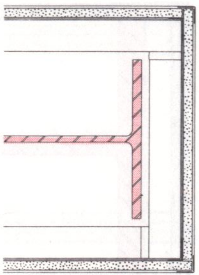
1½-hr.-rated bar joist ceiling

Assembly No.	STC Median	IIC Median	Wt. per Sq. Ft., Lbs. (Clg. Matls. Only)	Cost Index	Construction Detail	Description
59	40 (est)	—	3	58		⅝″ Sheetrock Firecode gypsum panels—furred or susp USG met fur chan 24″ o.c.—panels screw att 12″ o.c.—joints fin—2″ conc deck on riblath over bar joist—**UL Des 4-1½ hr (f)—est (s)**

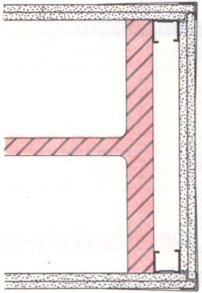
Non-rated bar joist ceiling

Assembly No.	STC Median	IIC Median	Wt. per Sq. Ft., Lbs. (Clg. Matls. Only)	Cost Index	Construction Detail	Description
60	45 (9-f) up & over	—	3	79		⅝″ Sheetrock Firecode gypsum panels—1½″ cr chan 4′ o.c.—USG met fur chan 24″ o.c.—panels screw att 12″ o.c.—joints fin—**N/A (f)—USG-5-FT-G&H (s)**

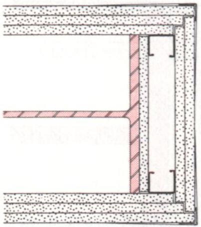
4-hr.-rated steel column fireproofing

Assembly No.	Column Type	Thickness, In.	Cost Index	Construction Detail	Description
61	W10 x49	2⅝	175		Pyrobar Gypsum Tile and Drywall Fireproofing—2″ solid tile around col—tile banded 24″ from ea end—contin met angles screw att to bands—1 layer ⅝″ Sheetrock Firecode gypsum panels screw att to angles—met corner beads—joints fin—**UL Des X502 (31-4 hr)—UL Des X504 (34-4 hr, based on 3″ hollow tile)**

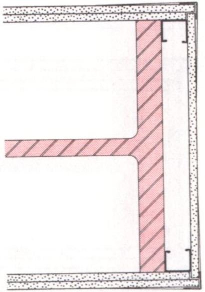
4-hr.-rated steel column fireproofing—continued

Assembly No.	Column Type	Thickness, In.	Cost Index	Construction Detail	Description
62	W14 x228	2⅝	105		Gypsum Drywall Fireproofing—2 layers ½″ SHEETROCK FIRECODE "C" gypsum panels around col—panels screw att to 1⅝″ USG met studs at col corners—met corner beads—joints fin—**UL Des X507 (48-4 hr)**

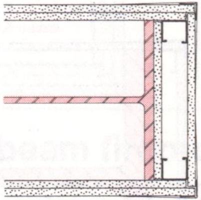
3-hr.-rated steel column fireproofing

63	W10 x49	1⅞	118		Gypsum Drywall Fireproofing—3 layers ½″ SHEETROCK FIRECODE "C" panels around col—triple layer over ea flange end—inner layers on flange face separ by 1⅝″ met studs & screw att—met beads on corners—joints fin—**UL Des X515 (41-3 hr.)**

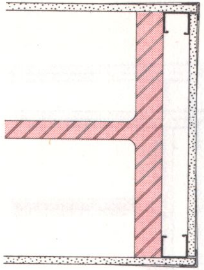
3-hr.-rated steel column fireproofing—continued

Assembly No.	Column Type	Thickness, In.	Cost Index	Construction Detail	Description
64	W14 x228	2⅛	91		Gypsum Drywall Fireproofing—½″ SHEETROCK FIRECODE "C" gypsum panels around col—dbl layer over ea web face—panels screw att to 1⅝″ USG met studs at col corners—met corner beads—joints fin—**UL Des X514 (40-3 hr.)**

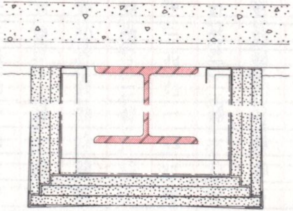
2-hr.-rated steel column fireproofing

65	W10 x49	2⅛	105		Gypsum Drywall Fireproofing—½″ SHEETROCK FIRECODE "C" gypsum panels around col—dbl layer over ea flange end—dbl layer on flange faces separ by 1⅝″ USG met studs and screw att—met beads on corners—joints fin—**UL Des X518 (10-2 hr)**

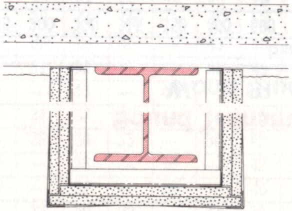
2-hr.-rated steel column fireproofing—continued

Assembly No.	Column Type	Thickness, In.	Cost Index	Construction Detail	Description
66	W14 x228	2⅛	78		Gypsum Drywall Fireproofing—½″ SHEETROCK FIRECODE "C" gypsum panels around col—panels screw att to 1⅝″ USG met studs at col corners—met corner beads—joints fin—**UL Des X521 (23-2 hr)**

3-hr.-rated beam fireproofing (beam only)

Assembly No.	Thickness, In.	Cost Index	Construction Detail	Description
67	3½	163		Gypsum Drywall Caged Beam Fireproofing—1⅝″ USG met run or 2″x1″ angle brackets 24″ o.c.—2″x1″ corner angles att to brackets—3 layers ⅝″ SHEETROCK FIRECODE gypsum panels att with Type S screws—1″ 20-ga galv hex mesh on bottom over middle layer—met beads on corners—joints fin—2½″ conc deck on fluted stl flr—**UL Des N505 (214-3 hr)**

2-hr.-rated beam fireproofing (beam only)

Assembly No.	Thickness, In.	Cost Index	Construction Detail	Description
68	1⅞	127		Gypsum Drywall Caged Beam Fireproofing—1⅝″ USG met run chan brackets 24″ o.c.—2″x1″ corner angles att to chan brackets—dbl layer ⅝″ SHEETROCK FIRECODE gypsum panels att with Type S screws—met beads on corners—joints fin—2½″ conc deck on fluted stl flr—**UL Des N501 (254-2 hr)—UL Des N502 (255-2 hr)**

Sound Transmission Loss—db

Wood Stud Partitions

Assembly No.	Test No.	Band Center Frequency—Hz																					STC Median
		125	160	175	200	250	315	350	400	500	630	700	800	1000	1250	1400	1600	2000	2500	2800	3150	4000	
2	TL-67-239	35	41	—	47	53	56	—	57	59	60	—	61	63	64	—	65	65	64	—	59	61	60
8	USG-46-FT-G&H	32	—	41	—	41	—	47	—	53	—	57	—	57	—	56	—	57	—	59	—	59	55
4	USG-710120	43	40	—	46	49	48	—	49	51	54	—	56	59	60	—	64	66	66	—	65	71	55
10	USG-221-ST-G&H	30	37	—	42	47	48	—	48	48	51	—	55	57	58	—	59	59	57	—	59	60	55
6	USG-33-FT-G&H	32	—	36	—	42	—	46	—	52	—	54	—	58	—	55	—	53	—	53	—	54	50
2	TL-67-212	26	30	—	33	39	42	—	47	49	52	—	55	57	60	—	61	61	58	—	53	56	50
7	USG-106-FT-G&H	28	—	39	—	43	—	47	—	53	—	57	—	60	—	64	—	59	—	60	—	65	50
4	TL-69-214	31	35	—	34	39	44	—	48	51	53	—	56	56	59	—	57	50	53	—	59	59	50
7	USG-155-FT-G&H	26	—	34	—	44	—	47	—	50	—	52	—	53	—	57	—	58	—	55	—	60	50
9	IBI-20-FT-G&H	27	—	34	—	41	—	44	—	46	—	52	—	55	—	54	—	56	—	55	—	56	50
5	TL-69-211	30	33	—	35	40	40	—	42	44	46	—	49	51	52	—	52	48	48	—	53	57	45
10	TL-69-52	21	28	—	34	35	39	—	41	41	46	—	49	51	54	—	56	55	53	—	52	55	45
13	TL-69-213	25	31	—	35	37	41	—	40	40	43	—	46	46	51	—	51	47	47	—	51	54	45
12	TL-60-52	29.5	—	32.5	—	39.5	—	43.5	—	46	—	48	—	50	—	51	—	49	—	44	—	49	45
15	BBN-700725	31	31	—	36	38	39	—	41	42	46	—	49	51	52	—	54	49	45	—	48	52	45
11	TL-57-14	19	—	23	—	30.5	—	35.5	—	38.5	—	41	—	43.5	—	—	—	45.5	—	—	—	46	40
16	IBI-5-FT-G&H	19	—	28	—	34	—	38	—	43	—	50	—	52	—	54	—	55	—	56	—	54	40
14	USG-30-FT-G&H	17	—	16	—	34	—	30	—	35	—	40	—	42	—	45	—	38	—	39	—	44	35

Metal Stud Partitions

Assembly No.	Test No.	Band Center Frequency—Hz																					STC Median
		125	160	175	200	250	315	350	400	500	630	700	800	1000	1250	1400	1600	2000	2500	2800	3150	4000	
18	USG-114-FT-G&H	32	—	39	—	44	—	48	—	55	—	56	—	57	—	59	—	62	—	58	—	56	55
17	USG-134-FT-G&H	33	—	43	—	48	—	49	—	56	—	57	—	60	—	60	—	63	—	60	—	60	55
25	CK-684-14	31	40	—	41	47	50	—	53	57	59	—	60	63	63	—	62	60	59	—	61	65	55
25	CK-684-13	29	38	—	40	46	49	—	54	56	58	—	60	62	63	—	61	62	61	—	63	64	55
23	CK-654-40	36	35	—	37	43	47	—	51	54	55	—	57	56	56	—	59	58	58	—	56	58	55
18	KSO-109006-a	36	41	—	48	47	46	—	50	51	52	—	54	57	58	—	58	57	55	—	57	62	55
18	CK-654-40	36	35	—	37	43	47	—	51	54	55	—	57	56	56	—	59	58	58	—	56	58	55
19	TL-69-159	30	37	—	40	42	48	—	52	53	54	—	55	57	58	—	60	59	52	—	49	52	50
20	USG-103-FT-G&H	34	—	36	—	44	—	46	—	52	—	56	—	57	—	60	—	53	—	53	—	55	50
20	KSO-109006-b	31	—	37	—	42	—	44	—	51	—	54	—	59	—	59	—	58	—	55	—	63	50
		31	32	—	39	42	42	—	47	51	52	—	56	59	59	—	59	58	56	—	58	63	50
26	TL-69-153	28	36	—	37	38	44	—	48	52	54	—	55	57	59	—	60	58	51	—	47	49	50
27	TL-65-158	27	29	—	35	37	40	—	43	48	52	—	53	52	54	—	55	54	49	—	44	47	50
24	USG-57-FT-G&H	30	—	33	—	43	—	42	—	50	—	57	—	56	—	57	—	59	—	51	—	51	50
26	BBN-700726	32	33	—	38	44	45	—	49	52	52	—	57	59	58	—	61	62	54	—	51	51	50
27	TL-69-42	21	29	—	32	35	40	—	45	48	51	—	53	55	57	—	58	56	49	—	42	43	45
19	TL-69-155	22	29	—	31	33	37	—	42	45	48	—	51	52	54	—	55	52	46	—	45	49	45
21	TL-60-113	—	—	38	—	43	—	48	—	50	—	50	—	50	—	48	—	44	—	49	—	55	45
28	BBN-710310	27	30	—	34	37	40	—	44	45	47	—	49	49	49	—	49	45	41	—	43	45	45
26	TL-69-148	18	25	—	29	30	33	—	38	42	44	—	48	51	53	—	53	49	42	—	41	45	40
29	USG-17-FT-G&H	26	—	32	—	36	—	38	—	42	—	49	—	53	—	53	—	40	—	41	—	47	40
30	TL-64-29	22	—	27	—	32	—	36	—	40	—	42	—	42	—	49	—	42	—	35	—	45	40
28	TL-70-106	14	21	—	27	29	29	—	33	36	41	—	46	49	50	—	49	43	38	—	39	43	35

Sound Transmission Loss—db

Wood Joist Ceilings

Assembly No.	Test No.	Band Center Frequency—Hz																						STC Median	IIC Median
		100	125	160	175	200	250	315	350	400	500	630	700	800	1000	1250	1400	1600	2000	2500	2800	3150	4000		
53	TL-70-9	—	39	45	—	45	49	52	—	54	57	60	—	63	67	70	—	70	65	63	—	69	77	60	
53	IN-70-4	48	41	34	—	27	23	22	—	18	14	10	—	7	7	6	—	5	6	7	—	7	—		70
43	BBN-670601	—	33	38	—	43	45	45	—	50	54	56	—	62	65	66	—	68	69	67	—	64	65	55	
43	BBN-670602	60	56	58	—	60	61	61	—	61	59	58	—	55	52	50	—	47	44	45	—	46	—		55
44	BBN-670705	—	35	35	—	39	42	45	—	49	53	56	—	58	59	60	—	59	62	62	—	62	64	55	
44	BBN-670706	62	60	59	—	61	63	62	—	61	61	60	—	59	58	58	—	58	55	55	—	56	—		45
46	BBN-671007	—	27	29	—	37	39	40	—	46	47	48	—	47	51	59	—	61	62	61	—	62	67	50	
46	BBN-671008	72	76	78	—	70	75	79	—	77	75	75	—	75	71	70	—	70	70	73	—	70	—		35
37	CK-6412-9	—	29	33	—	33	36	39	—	44	45	46	—	48	53	57	—	60	62	64	—	67	67	50	
		53	54	48	—	48	44	39	—	32	31	24	—	25	22	20	—	16	14	13	—	14	—		65
39	CK-6412-3	—	36	35	—	37	40	42	—	45	45	46	—	48	52	56	—	58	58	60	—	63	64	50	
		64	64	69	—	69	70	69	—	69	67	62	—	59	55	52	—	48	49	53	—	50	—		45
40	CK-6512-9	—	29	36	—	38	41	42	—	46	48	50	—	51	54	57	—	61	63	61	—	62	65	50	
		61	65	67	—	66	66	66	—	66	64	61	—	59	54	52	—	49	50	54	—	54	—		45
41	CK-6412-4	—	36	35	—	38	41	41	—	47	46	49	—	50	55	59	—	61	62	66	—	69	69	50	
		50	46	46	—	43	39	34	—	29	28	21	—	18	15	12	—	11	9	9	—	10	—		70
42	CK-6512-8	—	31	36	—	39	40	43	—	46	49	51	—	53	56	59	—	62	65	66	—	70	70	50	
		49	47	44	—	39	35	31	—	27	26	18	—	—	—	—	—	—	—	—	—	—	—		70
35	CK-6412-10	—	30	33	—	34	35	39	—	43	44	44	—	46	50	52	—	54	54	49	—	55	60	45	
		66	69	69	—	72	72	71	—	70	69	67	—	66	63	60	—	59	61	64	—	61	—		40

36	CK-6512-6	—	27	31	—	32	34	39	—	43	45	46	—	48	51	58	—	55	55	52	—	54	60	45	
		84	71	71	—	71	72	71	—	70	68	67	—	67	63	61	—	59	59	62	—	61	—		40
38	CK-6512-7	—	25	32	—	33	33	38	—	43	46	50	—	51	55	58	—	60	62	64	—	67	68	45	
		51	53	49	—	43	41	36	—	30	26	23	—	21	—	—	—	—	—	—	—	—	—		65
48	CK-6412-8	—	22	18	—	26	32	30	—	35	39	44	—	46	52	56	—	59	61	62	—	65	65	40	
		63	62	64	—	56	48	49	—	46	42	32	—	31	24	22	—	17	15	15	—	16	—		55
47	CK-6412-7	—	23	17	—	25	32	30	—	33	36	40	—	40	45	46	—	50	49	47	—	51	56	40	
		74	80	85	—	81	80	85	—	86	81	78	—	77	71	69	—	66	66	68	—	64	—		30
49	CK-6412-6	—	25	20	—	29	36	33	—	36	38	41	—	42	46	47	—	51	51	49	—	53	57	40	
		74	78	83	—	79	84	84	—	85	80	76	—	76	70	69	—	64	65	67	—	63	58		30
50	CK-6412-5	—	25	19	—	28	36	31	—	36	39	45	—	47	53	57	—	60	61	62	—	65	64	40	
		60	61	62	—	56	47	49	—	45	43	32	—	30	25	24	—	18	16	13	—	14	—		60
45, 53	NBS-77 P-716	—	34	—	25	—	24	—	30	—	36	—	39	—	42	—	48	51	51	—	51	—	56	35	

Bar Joist Ceilings

Assembly No.	Test No.	Band Center Frequency—Hz																						STC Median	IIC Median
		100	125	160	175	200	250	315	350	400	500	630	700	800	1000	1250	1400	1600	2000	2500	2800	3150	4000		
56	USG-189-FT-G&H	—	38	46	—	42	42	44	—	50	52	56	—	59	61	62	—	—	—	—	—	—	—		
58	BBN-681014	—	38	35	—	36	40	45	—	45	47	49	—	52	55	59	—	64	63	63	—	65	67	50	
58	BBN-681015	66	69	71	—	70	70	70	—	68	68	69	—	70	69	69	—	68	71	72	—	67	—		30
58	BBN-681016	67	67	70	—	67	66	63	—	57	51	44	—	42	39	36	—	34	34	35	—	30	—		50
58	BBN-681017	51	47	41	—	39	36	33	—	28	25	24	—	21	18	16	—	12	12	11	—	8	—		70
60	USG-5-FT-G&H	—	31	—	39	—	36	—	42	—	44	—	49	—	54	—	56	—	49	—	51	—	57	50	

Limiting Height—Metal-Stud Assemblies

stud width	stud spacing	allow. defl.	partition, one layer (1)	partition, one layer (2)	partition, two layers (1)	partition, two layers (2)	furring, one layer (1)	furring, one layer (2)
USG Metal Studs (Standard)								
1⅝″	16″	1/120 1/240	10′3″	11′0″d 8′9″d	10′6″	11′3″f 11′3″f	7′0″	10′0″f 8′6″d
	24″	1/120 1/240	9′0″	9′3″f 7′9″d	9′3″	9′3″f 9′3″f	—	8′3″d 7′6″d
2½″	16″	1/120 1/240	13′6″	14′9″f 11′9″d	13′3″	14′9″f 14′3″d	8′3″	12′6″f 11′6″d
	24″	1/120 1/240	11′9″	12′0″f 10′3″d	11′6″	12′0″f 12′0″f	—	8′3″f 7′6″d
3¼″	16″	1/120 1/240	18′6″	17′6″f 15′6″d	15′9″	17′6″f 16′9″d	9′3″	14′6″f 14′0″d
	24″	1/120 1/240	16′0″	14′3″f 13′6″d	13′9″	14′3″f 14′3″f	8′3″	11′9″f 11′9″f
3⅝″	16″	1/120 1/240	18′0″	19′0″f 15′3″d	17′0″	19′0″f 18′0″d	9′9″	15′3″f 15′3″f
	24″	1/120 1/240	15′9″	15′6″f 13′6″d	14′9″	15′6″f 15′6″f	8′6″	12′6″f 12′6″f
4″	16″	1/120 1/240	19′6″	20′3″f 16′6″d	18′3″	20′3″f 19′3″d	10′3″	16′3″f 16′3″f
	24″	1/120 1/240	17′0″	16′6″f 14′6″d	15′9″	16′6″f 16′6″f	9′0″	13′3″f 13′3″f
6″	16″	1/120 1/240	20′3″	19′9″f 17′0″d	21′9″	19′9″f 19′9″f	9′9″	15′0″f 15′0″f
	24″	1/120 1/240	17′6″	16′0″f 15′0″d	18′6″	16′0″f 16′0″f	8′9″	12′3″f 12′3″f

(1) Limiting height based on psychological response (see design recommendations, Chap. 1).
(2) Limiting height for ½″ or ⅝″ thick panels and 5 psf uniform load perpendicular to partition or furring. LImiting criteria: d—deflection, f—bending stress.

Limiting Height—"Series 4" Partitions

stud spacing	allow. defl.	one layer, 3" studs		unbalanced, 2½" studs		two layers, 2" studs	
		(1)	(2)	(1)	(2)	(1)	(2)
16"	1/120 1/240	17'6"	16'9"f 14'9"d	14'0"	14'9"f 13'9"d	11'9"	12'9"f 12'6"d
24"	1/120 1/240	15'0"	13'9"f 13'0"d	12'3"	12'0"f 12'0"d	10'3"	10'6"f 10'6"f

(1) Limiting height based on psychological response (see design recommendations, Chap. 1).
(2) Limiting height for ½" and ⅝" thick panels and 5 psf uniform load perpendicular to partition or furring. Limiting criteria; d—deflection, f—bending stress.

Limiting Height—Chase Wall Partitions

stud size and type	stud. spacing	allow. defl.	one layer		two layers	
			(1)	(2)	(1)	(2)
1⅝" std.	16"	1/120 1/240	16'3"	15'9"f 14'0"d	16'3"	15'9"f 14'0"d
	24"	1/120 1/240	14'0"	13'0"f 12'3"d	14'0"	13'0"f 12'3"d
2½" std.	16"	1/120 1/240	22'3"	21'0"f 18'6"d	19'3"	21'0"f 20'3"d
	24"	1/120 1/240	19'3"	17'0"f 16'3"d	16'9"	17'0"f 17'0"f
3⅝" std.	16"	1/120 1/240	30'0"	26'9"f 23'9"d	26'0"	26'9"f 25'9"d
	24"	1/120 1/240	26'0"	22'0"f 20'9"d	22'3"	22'0"f 22'0"f

(1) Limiting height based on psychological response (see design recommendations, Chap. 1).
(2) Limiting height for ½" or ⅝" thick panels and 5 psf uniform load perpendicular to partition. Limiting criteria: d—deflection, f—bending stress.

framing member spacing

SHEETROCK may be applied directly over wood studs, joists and rafters, or assembled with metal and gypsum components into systems that provide excellent sound- and fire-resistant construction.

Maximum spacings for wood framing members to receive SHEETROCK Panels are shown in the tables below. Spacings for systems components are shown in the descriptions of the various systems, Chapter 3.

Panel Thickness	Location	Application Method	Maximum Spacing Framing Members
Single-Layer Application			
⅜″	Ceilings(4)	Horizontal	16″ o.c.
⅜″	Sidewalls	Horizontal or Vertical	16″ o.c.
½″	Ceilings(4)	Vertical	16″ o.c.
		Horizontal	24″ o.c.
½″	Sidewalls	Horizontal or Vertical	24″ o.c.
⅝″	Ceilings(4)	Vertical	16″ o.c.
		Horizontal	24″ o.c.
⅝″	Sidewalls	Vertical or Horizontal	24″ o.c.
Double-Layer Application (1)			
⅜″(2)(3)	Ceilings(4)	Horizontal	16″ o.c.
⅜″(2)(3)	Sidewalls	Horizontal or Vertical	24″ o.c.
½″ & ⅝″	Sidewalls	Horizontal	24″ o.c.
½″ & ⅝″	Ceilings(4)	Horizontal or Vertical	24″ o.c.

NOTES: (1) Framing member spacing for single-layer construction applies to both base and face layers when adhesive is not used. (2) Adhesive must be used for ⅜″ panels in double-layer application. (3) Panels ⅜″ thick not recommended as base layer applied to metal framing over 16″ o.c. (4) Up to 6″ of wool insulation may be applied resting on SHEETROCK Panel ceilings, provided the maximum framing member spacing is not exceeded and joints are finished.

Thermal Transmission Values—Gypsum Products

Board Thickness	Density pcf	C*	R**
Regular SHEETROCK			
⅜″	45	2.96	0.34
½″	43	2.22	0.45
⅝″	44	1.89	0.53
SHEETROCK Firecode "C"			
½″	46.6	2.39	0.42
⅝″	44	1.89	0.53
SHEETROCK W/R			
½″	48.5	2.48	0.40
USG Sheathing			
½″	48.5	2.48	0.40

*Thermal Conductance **Thermal Resistance

Racking Study—USG Gypsum Sheathing

	at 1200-lb. load		at 2400-lb. load		
condition	deflection (in.)	set (in.)	deflection (in.)	set (in.)	maximum load (lbs.)
Dry	.089	.016	.230	.107	6000
Wet	.093	.032	.278	.130	4530

NOTES: Results cover panels without corner bracing sheathed with 4′x8′ USG Sheathing, ½″ thick. Based on averages of three panels tested at a nationally recognized testing laboratory.

fastener loading

Test results shown in following tables are recommended allowable loads under each condition of loading for partition system indicated. Recommended allowable load is an average of number of test loads applied to each fastener or attachment with a safety factor included. Caution must be exercised when using these recommended allowable loads. Withdrawal and shear tests were conducted on these fasteners because they are most extreme values that could be encountered in fixture attachment. However, there is rarely a true withdrawal or a true shear load on any fixture; it is usually a combination of the two. A hand rail would usually be subjected to a greater withdrawal load than a shearing load, but a wall cabinet more of a shearing load than a withdrawal load. This type of consideration must be made before a safe load can be determined for each application.

Fasteners were tested on small samples of partitions; therefore, consideration must be given when used with full-size partitions. If, for example, an elevator bolt has been found to support a 250-lb. load for a given condition, a 750-lb. fixture would require three closely spaced elevator bolts. Although each bolt can safely carry 250 lbs., the partition is not necessarily capable of supporting 750 lbs. Spacing and grouping of each type fastener becomes a definite consideration. Tests were conducted on a short term basis and vibration (especially applicable to friction type fasteners), wetting, and long term installation considerations were not examined.

Fastener Loads
No. 358 Metal Stud Drywall Partition

Type Fastener or Attachment	Allowable Withdrawal Resistance—Lbs.	Allowable Shear Resistance—Lbs.
1. No. 8 sheet metal screw through SHEETROCK Panels into metal stud	50	80
2. ¼″ molly bolt into ½″ SHEETROCK Panels only	35	80
3. ¼″ toggle bolt into ½″ SHEETROCK Panels only	40	60
4. No. 8 sheet metal screw in plastic plug	20	40
5. Heavy fixture attachment	70	250

Fastener Loads—2¼″ Vent Shaft Partition

Type Fastener or Attachment	Allowable Withdrawal Resistance—Lbs.	Allowable Shear Resistance—Lbs.
1. ⅜″ elevator bolt	250	450
2. No. 8 sheet metal screw into 25-ga. sheet metal plate	60	100
3. No. 8 sheet metal screw in plastic plug	20	40

chapter 5

drywall problems and remedies

page

PROBLEMS AND REMEDIES 262

Panels 262

Finish 264

Framing 266

Joints 267

Nailing 269

CHARACTERISTICS OF WOOD SHRINKAGE 271

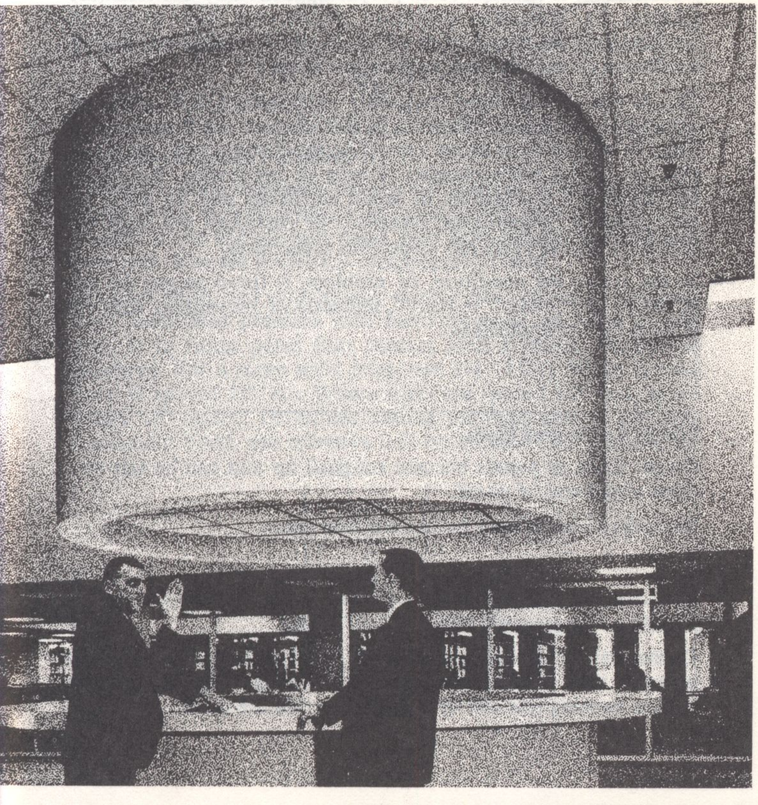
page

EFFECT OF WOOD SHRINKAGE ON NAILS 272

NAIL POPS DUE TO WOOD SHRINKAGE 274

CRACKING IN HIGH-RISE STRUCTURES 275

HOW TO INSPECT A DRYWALL JOB 277



problems: their cause, remedy or prevention

It is to your advantage to know and understand the conditions which may adversely affect quality of the finished drywall job.

Almost invariably, unsatisfactory results show up first in the areas over joints or nail heads. Improper application of either the panels or joint treatment *may* be at fault, but other conditions existing on the job can be equally responsible for reducing the quality of the finished drywall application.

Irregularities found over joints, for example, usually occur in a straight line pattern. These can be caused by joint ridging, starved joints, joints located over twisted studs or on high studs or joists, board edges damaged or out of plane, joists over which delayed shrinkage has occurred, or any combination of these. By using SHEETROCK SW Gypsum Panels with the exclusive rounded-edge configuration—and low-shrinkage DURABOND 90 Joint Compound to bond edges in a super-weld joint, many of these problems can be minimized. Joint ridging can be virtually eliminated.

Other compounds used for joint finishing are a "drying type" material and therefore harden as the contained water is evaporated. As they dry, their volume shrinks. Normal shrinkage offers no problem and is anticipated in proper application procedure (see Chapter 2). Excessive shrinkage, which can be a source of trouble, may be found to result from poor atmospheric or job conditions as well as from application abuses.

This is one of the more frequently encountered field problems covered in the tables following in this chapter. Each problem is listed in alphabetical order according to location, with the probable cause and recommended remedy or prevention. Following the tables are discussions of wood shrinkage and its effect on nail popping, precautions necessary in partitions for high-rise buildings, and drywall job inspection procedures.

In the tables the condition, or problem, is listed across the top of each item; under "remedy", methods of prevention also are included when applicable.

PANELS—Burred Ends

Cause: Ends of panels become roughed up and can be felt as a ridge along end of panel.

Remedy: Sand off burr before erecting panel.

PANELS—Improperly Fitted

Cause: Panels wedged into place or improperly nailed cannot be brought into natural contact with framing (Fig. 1), or may buckle, causing one end or edge to override the other.

Remedy: Remove panel, cut to fit properly, and replace. Nail from center of panel toward ends and edges. Apply pressure to hold panel tightly against framing while nailing.

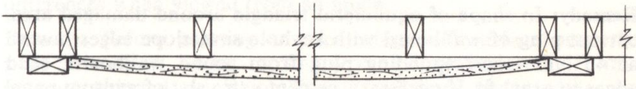


Fig. 1

PANELS—Damaged Edges

Cause: Paper-bound edges have been damaged or abused; may result in ply separation along edge or in loosening of paper from gypsum core. Also may fracture or powder the core itself; edges are more susceptible to ridging after joint treatment.

Remedy: Avoid butting together damaged edges that may easily be compressed. Handle SHEETROCK Panels with reasonable care. Cut back any severely damaged edges to sound board before application. **Preventive measure:** Use of SHEETROCK SW Gypsum Panels will reduce the incidence of edge damage because of exclusive eased-edge design (Fig. 2).

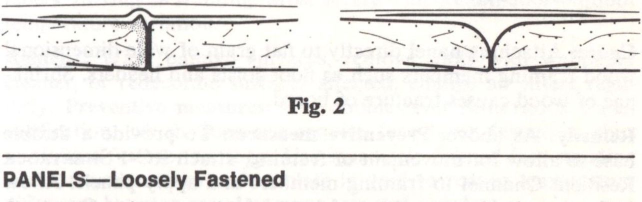


Fig. 2

PANELS—Loosely Fastened

Cause: Framing members are uneven because of minor bowing and warping; lack of pressure on panel during fastening. Head of fastener alone cannot pull panel into firm contact with uneven members. Also see PANELS—Improperly Fitted.

Remedy: With nail attachment, during final blows of hammer apply additional pressure with hand to panel adjacent to nail (Fig. 3) to bring panel into contact with framing. **Preventive measures:** For a more solid joint, use 1¼″ USG Brand Screws Type W spaced 12″ o.c. Where studs are spaced 16″ o.c., space screws 16″ apart. To reduce nailing required and to improve attachment bond, use adhesive nail-on method (see Chapter 2).

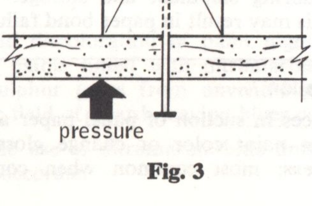


Fig. 3

PANELS—Surface Fractured After Application

Cause: Excessive abuse or heavy blows have fractured finished wall surface—too large a break for repair with joint compound.

Remedy: In shape of equilateral triangle around damaged area, cut out plug of wallboard with keyhole saw, slope edges inward at 45°. Cut corresponding plug from sound wallboard, sand edges to exact fit. If necessary, cement extra slat of gypsum panel to back of face layer to serve as brace. Butter edges (Fig. 4) and finish as a butt joint with joint compound (Fig. 5).

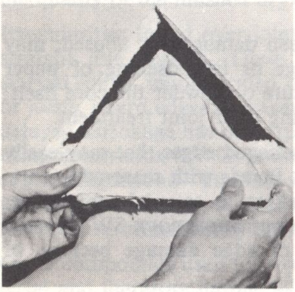


Fig. 4

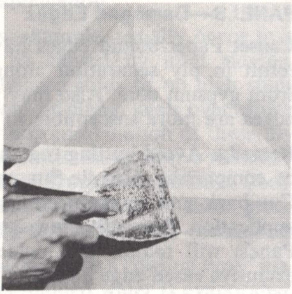


Fig. 5

Cause: Attaching panel directly to flat grain of wide-dimensional wood framing members such as floor joists and headers. Shrinkage of wood causes fracture of board.

Remedy: As above. **Preventive measures:** To provide a flexible base to allow for movement of framing, attach RC-1 SHEETROCK Resilient Channel to framing members and apply panels. Allow ½" space at bottom edges of board for movement. Or attach board directly to studs but allow ¼" separation between panels and install USG Control Joint No. 093 (see Chapter 3—Single Layer Application).

PANELS—Water-Damaged

Cause: During transit or storage, water has damaged panels; subject to scuffing, may develop paper bond failure. Dissolved glue from bundling tapes may damage board faces and cause them to stick together. If stored wet, may be subject to mildew.

Remedy: Usually will dry and perform satisfactorily; handle board cautiously and re-pile with bundles separated by spacer strips of wallboard. Check incoming board for water stains, protect carefully during shipment and storage. Do not erect damp panels for this may result in paper bond failure.

FINISH—Discoloration

1. **Cause:** Differences in suction of panel paper and joint compound may lighten paint color or change gloss or sheen in higher suction areas; most common when conventional oil

paints are used; also caused by over-thinning of paint. Suction differences may also cause greater amounts of texturing material to be deposited over high suction areas causing color differences when viewed from an angle.

Remedy: Before painting and texturing, seal surface properly with SHEETROCK Sealer or TEXOLITE Primer-Sealer under oil- or water-thinned paints; or TEXOLITE Primer under whites or light pastels.

2. Cause: Joint darkening may occur, most commonly with tinted paint color rather than white. Most severe when painting has been done in humid weather or when joints have not fully dried; also when high or medium alkaline joint compounds have been used.

Remedy: Use only U.S.G. joint compounds, formulated with low alkalinity. Under humid conditions, compounds should dry 48 hours or more between coats. Repaint only after joints are thoroughly dry.

3. Cause: Temperature differentials in outside walls or top floor ceilings cause interior condensation which when combined with airborne dust results in photographing or shadowing over fasteners, furring or framing. Most severe with great indoor-outdoor temperature variation.

Remedy: Wash painted surfaces, remove spots with wallpaper cleaner, or redecorate surfaces affected; change air filters regularly. **Preventive measures:** Use double-layer SHEETROCK Panel application, which does not require face layer fastening, thus minimizes fastener spotting. Use separately framed free-standing interior wall surface and insulate in void to reduce temperature difference between metal components and panels.

4. Cause: Browning may occur over joints when poor quality polyvinyl acetate based paints have been used, primarily in highly humid weather.

Remedy: Redecorate with a quality U.S.G. latex, alkyd flat or texture paint.

5. Cause: Alkali discoloration or "burning" may occur with oil paints tinted with alkali sensitive pigments; appears as color change generally toward red or orange. Caused by diffusion of alkalies from high alkaline joint compounds into paint.

Remedy: Use a U.S.G. joint system, free of this danger. Use water-thinned paints, which have alkali-resistant pigments.

6. Cause: Acid discoloration of paint pigments affects oil or water-thinned paints tinted with ultramarine blue. Caused by reaction to sulphur gases from unvented gas or oil heaters. Color fades in field of board, leaving bluer color at joints.

Remedy: Avoid use of ultramarine blue tints in paint; vent all heaters and redecorate.

FRAMING—Members Out of Alignment

Cause: Due to misaligned top plate and stud, hammering at points "X" (Fig. 6) as panels are applied on both sides of partition will probably result in nail heads puncturing paper or cracking board. Chances of nail pops also are increased if panels are applied over such misaligned members. Framing members more than ¼″ out of alignment with adjacent members make it difficult to bring panels into firm contact with all nailing surfaces.

Remedy: Check alignment of studs, joists and plates before applying panels, and correct before proceeding. Straighten badly bowed or crowned members. Shim out flush with adjoining surfaces. Use Adhesive Nail-On method of attachment. **Preventive measure:** Apply SHEETROCK SW Panels–rounded edges tend to minimize possibility of visible defects in surface.

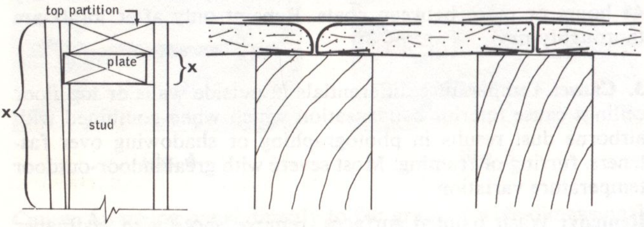


Fig. 6

FRAMING—Members Twisted

Cause: Framing members have not been properly squared with plates, presenting angular nailing surface (Fig. 7). When panels are applied, there is danger of puncturing paper with nail heads or of reverse twisting of member as it dries out, with consequent loosening of board and probable nail pops. Warped dimension lumber may contribute to this deformity.

Remedy: Align all twisted framing members before application. Also see Framing Requirements, Chapter 2. **Preventive measure:** Use SHEETROCK SW Panels to eliminate sharp, protruding corners.

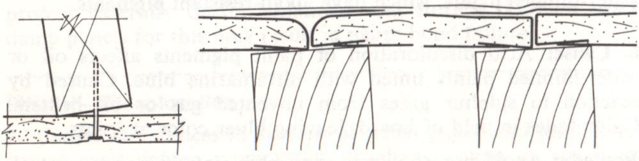


Fig. 7

FRAMING—Protrusions

Cause: Bridging, headers, firestops or mechanical lines have been installed improperly so as to project beyond face of framing, preventing panels from contacting nailing surface (Fig. 8). Result will be loose board, and nails driven in area of protrusion will probably puncture face paper.

Remedy: Before applying panels, check to make certain there are no protrusions beyond plane of nailing surface. See that they are trimmed off or reinstalled.

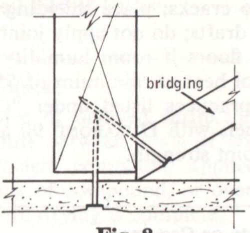


Fig. 8

JOINTS—Blisters in Tape

Cause: Insufficient compound was used under the tape, or tape was not initially pressed into good contact with the compound.

Remedy: Open up blistered area by slitting tape. Fill cut with joint compound and press tape back in place with knife blade. When dry, sand to smooth, level finish.

JOINTS—Cracks in Inside Corners

Cause: Too much compound applied over tape at apex of angle, or improper framing and/or board application.

Remedy: Wipe down corners correctly after applying compound, leaving only a small amount or no compound in apex. If cracks still occur, excessive structural movement is the cause.

Preventive measures: Where structural movement is cause, use floating interior angle application described in Chapter 2. For controlled cracking where dissimilar surfaces join, slit tape in corners using sharp knife. If cracks do occur, they will be inconspicuous.

JOINTS—Edge Cracking

Cause: After completion of joint treatment, straight narrow fissures or cracks may appear along edges of tape. This can result from: too rapid drying because of high temperature accompanied by low humidity, or excessive drafts; improper application, such as overdilution of joint compound, excessive joint compound under tape or failure to follow embedding with a skim coat over tape; cold, wet application conditions which also may cause poor bond.

Remedy: Especially when poor atmospheric conditions exist, carefully examine all joints after taping and skimming applications have dried; repairs are more economical at this stage. Cut away any weakly bonded tape edges. Fill hairline cracks with cut shellac (2 to 3 lbs.); groove out larger cracks with sharp tool, coat with shellac and allow to dry, then refill with joint compound; or cover cracks with complete joint treatment including reinforcing tape, feather to even surface with plane of board. **Preventive measures:** Use USG Ready-Mixed Joint Compound or DURABOND Joint Compound which have maximum built-in resistance to cracks; place shielding devices over room openings to prevent drafts; do not apply joint treatment over hot surfaces; wet down floors if room humidity is too low; during cold weather, control heat at minimum of 55° and supply good ventilation. Avoid practices listed under "Cause," above. Use SHEETROCK SW Panels with DURABOND 90 and USG Joint System for maximum joint strength.

JOINTS—High Joints or Crowns

Cause: Needless piling of compound in channel; compound not feathered out beyond shoulders; insufficient sanding; framing out of alignment or panel edges not tight against framing.

Remedy: Sand joints to flush surface. If misaligned framing or board are responsible, see "Framing" or "Panels" problems.

JOINTS—Ridging

Cause: All building materials grow or shrink in response to changes in temperature and humidity. When they are confined to a specific space, such as gypsum panels in a partition or ceiling, they are put under stress, either compression or tension, depending on the temperature or humidity conditions. These stresses are relieved when the panel bends outward in the region of the joint. Once this bending takes place, the system takes a set and never returns to normal. It becomes progressively worse with each change of temperature or humidity. This progressive deformation appears as a continuous ridge along length of joint, with uniform fine, ridge-like pattern at the center.

Remedy: (1) Let ridge develop fully before undertaking repairs—usually six months is sufficient. Time repairs for hot and dry conditions. (2) Sand ridge down to reinforcing tape without cutting through tape. Fill concave areas on either side of ridge with light fill of thick mix compound. After this is dry, float very thin film of compound over entire area. (3) Examine area with strong side lighting to make certain that ridge has been concealed. If not, use additional coats of compound. Redecorate. **Preventive measures:** Use SHEETROCK SW Panels with the exclusive rounded edge designed to prevent ridging. Follow general recommendations for joint treatment (Chapter 1) and approved application procedure (Chapter 2). Pay particular attention to temperature, ventilation, consistency of compound, prompt covering coat over tape, minimum width of fill and finish coats and required drying time between coats.

JOINTS—Excessive Shrinkage

Cause: (1) Atmospheric conditions—slow drying and high humidity; (2) Job conditions—inadequate protection from hot drafts; (3) Insufficient drying time between coats of compound; (4) Excessive water added in mixing compound; (5) Heavy fills.

Remedy: See "Starved Joints" below.

JOINTS—Starved Joints

Cause: This is a form of delayed shrinkage caused chiefly by insufficient drying time between coats of compound. May also be caused by insufficient compound applied over tape to fill channel, over-thinning of compound, or oversanding. Shrinkage usually progresses until drying is complete.

Remedy: Reapply a full covering coat of heavy-mixed compound over tape—since this is heaviest application, most shrinkage will take place in this coat, making it easier to fill channel properly. Finish by standard procedure. **Preventive measure:** Allow each coat of joint compound to dry thoroughly before applying succeeding coat.

NAILING—Nail Pops

Cause: A protrusion directly over the head of a nail results from outward movement—of the concealed nailhead in relation to the smooth finished surface of panels. This protrusion is usually only slightly larger than the nail head but may be about the size of a hammer dimple and is known as a nail pop. It may occur with any type of material secured to wood with nails. With drywall, it is the product of improper application, lumber shrinkage, or a combination of both. With panels held reasonably tight against framing member (Fig. 9 below), only severe shrinkage of the lumber normally will cause nail pops. But if nailed loosely (Fig. 10), any inward pressure on panel will push nailhead through its thin covering pad of compound. Likewise, panels insecurely nailed (Fig. 11) are subject to movement and vibrations which result in nail pops. Pops resulting from "nail creep" occur when shrinkage of the wood framing exposes nail shank and consequently loosens panel (see "Wood Shrinkage" discussion following table).

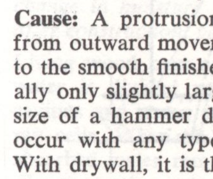


Fig. 9

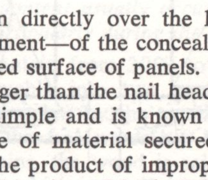


Fig. 10

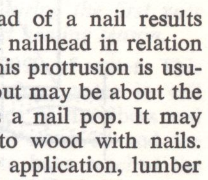


Fig. 11

Remedy: Repairs usually are considered necessary only for pops which protrude .005″ or more from face of board. Smaller protrusions may require repair if they occur in a smooth gloss surface or flat painted surface under extreme lighting conditions. Those which appear before or during decoration should be repaired immediately. Pops which occur after one month's heating or more are usually caused wholly or partly by wood shrinkage, and should not be repaired until near end of heating season. Repair procedure is to select proper nail for thickness of panel, then drive it about 1½″ from popped nail while applying sufficient pressure adjacent to nailhead to bring panel in firm contact with framing. Strike popped nail lightly to seat it below surface of board. Remove loose compound and apply finishing coats of compound and paint. **Preventive measures:** removal of insecure nails and proper nail application; use of lumber meeting Framing Requirements (Chapter 2); attachment with USG Brand Screws or by Adhesive-Nail-on Application (Chapter 2).

NAILING—Puncturing of Face Paper

Cause: Twisted or misaligned framing members, protrusions of bridging, poorly formed nailheads, careless nailing, or excessively dry face paper can bring on puncturing problems. Nailheads which puncture face paper and shatter core of panel (Fig. 12) have very little grip on board and often cause nail pops.

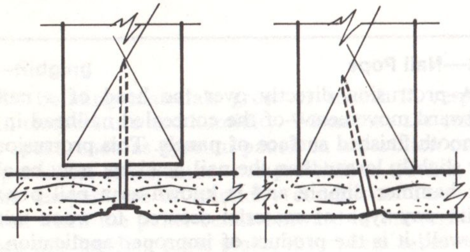


Fig. 12

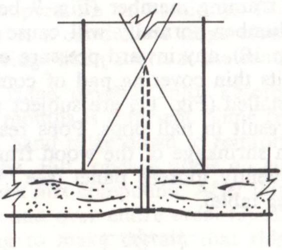


Fig. 13

Remedy: Correction of faulty framing (see Framing Problems, above) and properly driven nails produce tight attachment with slight uniform dimple (Fig. 13). Nailhead bears on paper and holds panel securely against framing member. Recommended

GWB-54 nails have a head designed to minimize cutting; USG Brand Screws with specially contoured head are best fastener known to eliminate cutting and fracturing. If face paper becomes dry and brittle, its low moisture content may aggravate nail cutting. One remedy is to hang panels in position with a few nails, then sponge or fog-spray areas in which other nails will be driven. Other methods are to cover stacked panels with vaporproof plastic sheets and place pails of water under sheets, to stack panels on concrete slabs, fog-spray the framing, or splash water across floors. Otherwise, replacement of nails and filling of depressions in joint compound may be necessary.

characteristics of wood shrinkage

Framing lumber as commonly used has a moisture content in the range of 15% to 19%. However, individual pieces may be considerably higher or slightly lower.

Wood having a moisture content at the time of construction in the 15% to 19% range may, in service, eventually reach a moisture content of from 5% to 10%, except in the damp Southern coastal states and the dry Southwestern states, where the ranges may be 8% to 13% and 4% to 9% respectively. Thus, when wood is framed into a building and the building is put into service, the framing lumber loses some of its moisture content. After the lumber has eventually reached equilibrium with surrounding conditions, there will be only minor residual increases and decreases in its moisture content. *The important fact to be established here is that the first and by far the greatest change in moisture content usually occurs during the first year after construction, particularly during the first heating season.*

Living wood may contain from 30% to 300% of water. This water is divided roughly into two parts—free water in cell cavities and water *absorbed* by the capillaries of the fibers and ray cells. When all the free water has been removed and the absorbed water remains, the wood is said to have reached the *fiber saturation point,* which is approximately 30%.

Wood shrinks as the moisture content of the wood is reduced below 30%. *As the moisture content of a piece of wood is reduced below the fiber saturation point, the unit of shrinkage is fairly uniform, being approximately 1/30 of the total shrinkage which may occur for each 1% loss of moisture content.*

Wood shrinks most in the direction of the growth rings (flat grain) somewhat less across the growth rings (edge grain) and very little, as a rule, along the grain (longitudinally). Generally, heavier pieces of the same wood species shrink more than the lighter ones. (These characteristics often account for a lot of nail pops along the length of a particular stud or joist.)

Under job conditions, the gypsum panels are usually applied within two to four weeks after the building has been enclosed. During this period the framing will dry out to a certain extent, depending upon drying conditions. *However, even under the most favorable drying conditions and four weeks' exposure, it is* *doubtful that the moisture content of the framing will reach a percentage as low as that which will occur "in service."*

(The authority for the preceding is U.S. Department of Agriculture publication, Wood Handbook No. 72, in a section titled "Control of Moisture Content and Shrinkage of Wood." Obtainable from Supt. of Documents, U.S. Government Printing Office, Washington 25, D.C.)

Each increment or part of a mass of wood shrinks at a fairly uniform rate. Shrinkage in a mass of wood is toward the center. The movement of any point on the wood or boundary, such as an outer surface towards the center, is equal to the total of the shrinkage of each increment between that point or boundary and the center.

For example, Fig 14 shows a mass of wood 4″ wide by 2″ thick divided into 1″ increments. For purposes of illustration, a total of 1/16″ shrinkage has been selected for each 1″ increment under conditions wherein the moisture content has been reduced from 19% to 10%. The outer plane of Areas "A" has moved 1/16″ closer to the horizontal center line. The outer surface of Areas "B" has moved ⅛″ closer to the horizontal center line (1/16″ for the shrinkage in Areas "A" plus 1/16″ for the shrinkage in Areas "B"). Similar proportionate shrinkage also occurs in relationship to the vertical center line.

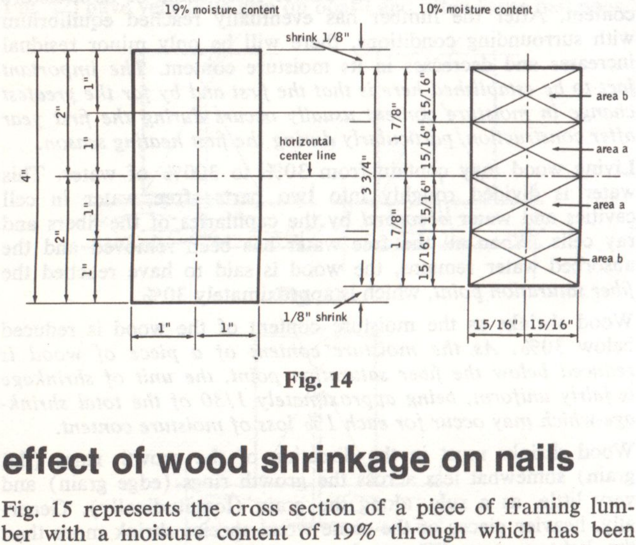


Fig. 14

effect of wood shrinkage on nails

Fig. 15 represents the cross section of a piece of framing lumber with a moisture content of 19% through which has been driven a steel rod with both ends sheared off flush with the surface. The right hand drawing represents the same piece of wood after the moisture content has been reduced to 10%. Note that wood shrinkage has resulted in a movement of each outer edge surface of the wood ⅛″ towards the center line; also, that the steel rod protrudes from the lumber on each edge ⅛″.

Note: The dimensions used in Figures 16 to 18 inclusive were selected only for convenience to illustrate principles and *are not to be construed as actual measurements.*

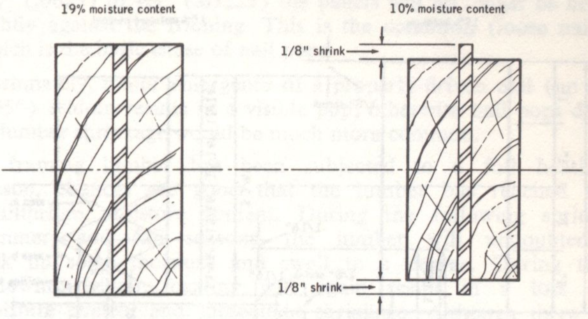


Fig. 15

Fig. 16 illustrates the same conditions as in Fig. 15 except that nails have been driven different distances into the 19% moisture content wood, one nail penetrating 2″ and the other 1″. The sections of the nails protruding from the wood were then sheared off flush with the surface as illustrated by the drawing on the left.

In the drawing on the right, the wood penetrated by the 2″ section of the nail shrank ⅛″, resulting in an exposure of ⅛″ of the nail shank. In this same drawing, note that the *wood penetrated* by the 1″ nail shrank 1/16″, resulting in an exposure of the nail shank of only 1/16″. The 1/16″ shrinkage of the *wood between the point of the 1″ nail and the center line* resulted in the nail's moving 1/16″ toward the center line.

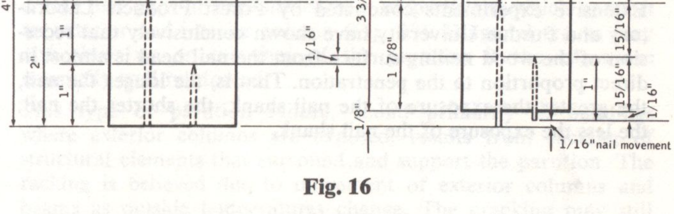


Fig. 16

Figures 17 and 18 illustrate ½″ gypsum panels attached with nails having a penetration of 2″ and 1″ respectively. The figures on the right show how the emergence of the nail due to wood shrinkage creates a space between the back of the panel and the nailing surface. A comparison of distances between backs of panels and nailing surfaces of Figures 17 and 18 shows that use of the *shorter nail* resulted in a *smaller* space between back of panel and nailing surface.

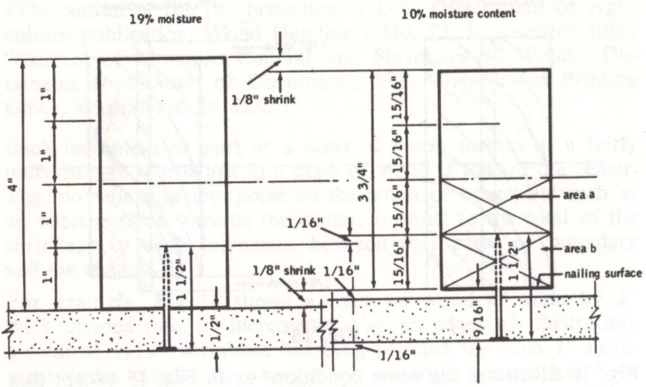


Fig. 17

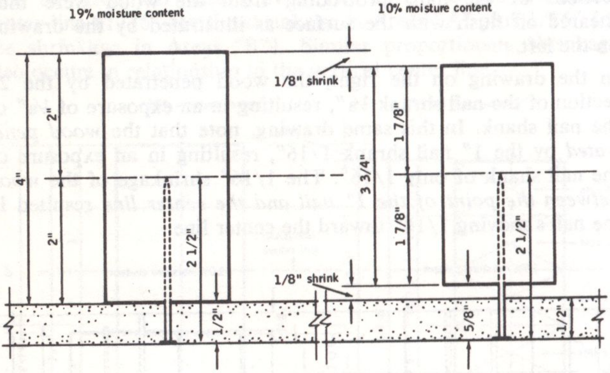


Fig. 18

Extensive experiments conducted by Forest Products Laboratory and Purdue University have shown conclusively that recession of the wood nailing surface from the nail head is almost in direct proportion to the penetration. That is, the longer the nail, the greater the exposure of the nail shank; the shorter the nail, the less the exposure of the nail shank.

nail pops due to wood shrinkage

As previously shown, as the framing lumber shrinks, the distance between the head of the nail and the nailing surface of the framing member increases. Assuming that the nail originally held the gypsum panels reasonably secure against the framing, the panels are held less securely after the framing has shrunk. If the additional nail shank exposure is in the range of 1/16" (.0625) to 1/32" (.03125) the panels will no longer be held tightly against the framing. This is the condition (loose nail) which is the basic cause of nail pops.

Fortunately, minor emergence of a properly driven nail (up to .005") seldom results in a visible pop; otherwise nail pops due to lumber shrinkage would be much more common.

If framing lumber has been subjected to a full heating season, chances are good that the lumber has reached an equilibrium moisture content. During the following spring, summer, and fall seasons, the lumber will undoubtedly pick up some moisture and swell to a degree. During the following winter, heating will again result in a loss of moisture content and subsequent shrinkage. Although there is little factual data on what actually occurs, it is believed seasonal fluctuations are usually in the range of not more than 2% to 4% moisture content differences. Under these conditions, movement is so slight that there is little danger of future pops.

cracking problems in high-rise structures

Drywall contractors who install commercial partitions should be aware of the cracking problems that have recently been identified in high-rise buildings employing "flat plate" reinforced concrete construction. In this design the underside of the concrete structural floor slab becomes the base for a ceiling.

Cracking of partitions has occurred in "flat plate" buildings—most seriously in the upper floors—in various parts of the U.S. Extensive research by United States Gypsum has established that this cracking occurs in two distinct patterns traced to two different probable causes associated with the design of the building. *Neither can be attributed to faulty materials.*

One pattern, known as **Type A,** usually occurs in the form of cracks and gaps at opposite corners of partitions which connect an exterior and interior column (Fig. 19). Diagonal cracks may also show up on the face of the partition if the edges are unusually well reinforced.

This type of partition failure, found primarily in buildings where exterior columns are exposed, results from racking of structural elements that surround and support the partition. The racking is believed due to movement of exterior columns and beams as outside temperatures change. The cracking may still occur, but is less severe when the partitions are supported by a suspension system.

On the basis of research and job experience, two factors can be estimated—the *"critical height"* above which Type A cracking may occur in flat plate buildings of various heights; and the *amount* of slab deflection, resulting from column movement, that may be expected in those buildings in various climatic areas of the U.S.

Both factors are shown in the table below. The amounts of anticipated deflection are given for four different temperature ranges based on low average winter temperatures (+20° to −20°F.). The movement for all four ranges is calculated from a 70° average. It is assumed that upward movement from summer temperatures and sun load will be no greater than the downward deflection in winter.

Height of Building	Critical Height	Calculated Amount of Slab Deflection			
		70° to +20°	70° to 0°	70° to −10°	70° to −20°
10 floors— 95′	6th floor	.106″	.156″	.180″	.200″
15 floors—140′	8th floor	.160″	.230″	.260″	.295″
20 floors—185′	10th floor	.220″	.305″	.350″	.390″
25 floors—230′	12th floor	.270″	.378″	.430″	.485″
30 floors—275′	14th floor	.320″	.450″	.520″	.585″
35 floors—320′	16th floor	.375″	.525″	.600″	.675″
40 floors—365′	18th floor	.430″	.600″	.680″	.765″

The second pattern of cracking, identified as **Type B,** is predominately found near the center of a partition span (Fig. 20). It is believed to be the result of flexural tension as the wall panel tries to follow the deflection of the flat plate floor and/or ceiling. Flexural cracks are widest at the bottom, and run out as they move vertically up the partition. They are typically much narrower than Type A cracks and may be expected anywhere in the building, not just on the upper floors. They are less likely to occur when the wall connects to a suspended ceiling than when it extends to the bottom of the structural floor.

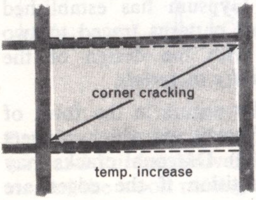


Fig. 19—Type A

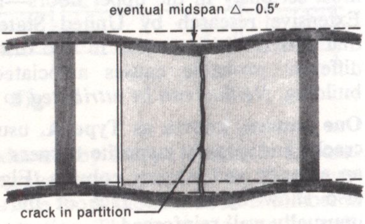


Fig. 20—Type B

Not only is Type B cracking less severe than Type A, but the probable amount of deflection in the flat plate—responsible for its occurrence—can be calculated by the structural engineer in advance with reasonable accuracy.

The question of "What can be done about it?" has at least four prospective answers:

1. After the cracking has occurred, repairs can be undertaken —but they are likely to be successful only in the case of Type

B cracking. Since the basic deflection gradually decreases, Type B cracks can be filled satisfactorily after about one year. On the other hand, Type A cracking cannot be repaired by filling the cracks, since the racking distress reverses with a change in seasons. A corner that is now being pulled apart will show signs of compression six months later.

2. In design of the building, anticipated structural movement in the frame and deflection in the floor system should be taken into account. Preliminary investigation indicates that exposed concrete columns and shear walls can be safely used in structures from six to ten stories high in most areas.

3. For the critical upper floors of a taller flat plate building (see table, above), the architect should select, or the contractor should suggest, partition and ceiling systems that have sufficient resistance to the stresses causing Type A cracks. Also, to reduce the amount of movement of exterior beams and columns due to temperature changes, insulation should be installed or other measures used to counteract critical conditions.

4. Control or "slip" joints should be provided at the periphery of walls installed on critical floors. Such joints minimize the effect of both structural movement and flat-plate deflection. USG Control Joint No. 093, which relieves stresses across the joint, should be used on long runs or wide expanses of gypsum panels where there is danger of cracking or buckling due to thermal or structural movement. See Chapters 1 and 2.

It is clear that problems of partition cracking with flat plate construction are best met by preventive measures before installation, rather than by attempted repairs afterward. Meanwhile, United States Gypsum is making intensive efforts to develop partition walls that can accommodate the building movements, rather than resist them—and still maintain past economies.

how to inspect a drywall job

Proper drywall job inspection during installation many times reveals potential problem areas or procedures that will produce unsatisfactory results. Corrective action taken immediately is usually less costly than callbacks to repair and perhaps rebuild walls and ceilings after the job is completed.

A complete understanding of job details, schedules, and specifications is necessary to conduct proper inspection. If the assembly is to meet fire and sound rating requirements, then construction details must also be known. All walls and ceilings must be judged by these criteria and the awarded contract. Thus it is important that drawings and specifications be complete, accurate and easily understood.

The following discussion is aimed at preventing trouble before it starts. Proper planning and attention to printed instructions will many times eliminate the need to refer to earlier parts of this chapter. A better, high quality drywall job will be produced with a minimum of effort and unprofitable extra cost.

schedule of inspection

Make job inspections at the following stages:

A. When drywall materials are shipped to the job, (1) verify that material meets specifications and approvals, (2) check for proper storage of materials (see Chapter 2). Damaged materials should not be used.

B. When framing is erected but before panel application.

C. When base layer is applied; when face layer is applied.

D. When joints are treated, (1) during taping and first coat application, and (2) during second coat application.

E. When job is completed.

installation inspection

Job inspection should include the installation of *all* materials with particular attention directed to the following items:

Framing

1. Check accuracy of alignment and position of framing according to plans or details.

2. See that partitions are straight and true; ceilings level.

3. Measure spacing of studs and joists. Spacing should not exceed maximum allowable for the system.

4. Verify that there is caulking beneath runners, if required.

5. Look for protrusions of blocking, bridging, or piping, and twisted studs and joists that would create an uneven surface. Correct situation before panel attachment.

6. Make sure there is appropriate blocking and support for fixtures and panels.

7. Measure the moisture content of wood framing with a moisture meter. Delay panel application until moisture content is 15% or less.

8. Check to see that window and door frames, electrical and plumbing fixtures are set for the panel thickness used.

9. Check for proper position and attachment method of RC-1 Resilient Channels.

10. Review all wood framing for compliance with minimum framing requirements outlined in Chapter 2.

11. Examine metal studs at corners, intersections, terminals, door and borrowed light frames for positive attachment to floor and ceiling runners.

12. Inspect spliced metal studs for proper assembly.

13. See that door and borrowed light frames are securely attached to stud and runner rough framing at all anchor clips.

14. Look for spot grouting at door and borrowed light frames.

Suspended Grillage

1. Measure spacing of hangers, channels and studs to see that they are within allowable limits.

2. Check ends of main runner and furring channels. They should not be let into or supported by abutting walls, and should extend to within 6″ of the wall to support a furring channel.

3. Make sure furring channel clips are alternated and that furring channel splices are properly made.

4. See that mechanical equipment is independently supported and does not depend upon the grillage for support.

5. Inspect construction around light fixtures and openings to see that recommended reinforced channel support is provided.

Base Layer

1. Verify that material being used complies with the specifications and fire or sound test construction.

2. Make sure the proper type of application is being used, horizontal or vertical application, and that joints are staggered.

3. Check for cracked and damaged edge panels. These should not be used.

4. See that the recommended fastener is being used and measure the spacing of fasteners.

5. Check caulking for proper seal behind electrical boxes, medicine cabinets, etc.

6. Inspect installation to make sure insulating wool blankets are adequately attached and properly fitted.

7. Review appropriate system construction and application, and inspect for compliance with laminating recommendations and other construction procedures.

Face Layer

1. Verify material compliance.

2. Look for high quality workmanship. Cracked or damaged-edge panels should not be used. Panel surfaces should be free of defects; joints correctly butted and staggered.

3. Check proper application method—horizontal or vertical.

4. Examine fasteners for compliance with specifications, and measure the spacing of fasteners.

5. Review adhesive application method and see that recommendations and specifications are being followed.

6. Inspect trim at corners and around partition perimeter for secure attachment and proper installation.

7. Make sure that caulking is applied where required and completely seals the void.

8. Review back-blocking installation to be sure correct procedure is followed (see Chapter 2).

Fasteners

1. Make sure recommended or specified fasteners are used.

2. See that fasteners are applied starting in the center of the panels and working to the ends and edges.

3. Observe whether the panel is held tightly against the framing. Test for loose board by pushing adjacent to the fastener. Check to see that the face paper is not broken when fastener is driven. If necessary, a second fastener should be driven within 1½″ of the faulty one.

4. Examine fastener positions. Fasteners should be at least ⅜″ in from edges and ends.

Adhesives

1. See that adhesive is applied only to clean, dry surfaces.

2. Make sure that panel is erected within the allowable time limit after adhesive is applied so proper bond can be obtained.

3. Measure size of bead and spacing. Check for correct shape.

4. Observe impacting blows for proper spacing and positioning.

5. Make sure temporary fastening and shoring holds panel tightly in place.

6. Review the appropriate adhesive application methods (Chapter 2) and inspect for compliance.

Joint Treatment

1. Make sure panel surface is ready for joint treatment. Fastener heads should be properly seated below panel surface. Protrusions should be sanded below level of surface. Cracks between panels should be filled with joint compound before taping.

2. See that recommended mixing directions are followed (see Chapter 2). Only clean water and mixing equipment should be used. DURABOND Joint Compounds should not be held over or retempered.

3. USG Brand Joint Compounds can be used almost immediately after mixing. Make sure that directions are followed closely both for mixing and application.

4. Inspect joints and corners to see that the tape is properly embedded and covered promptly with a thin coat of joint compound. Only compounds suitable for embedding should ge used. Heavy fills should be avoided.

5. Make sure that compound is used at its heaviest workable consistency and not over-thinned with water.

6. Check to see that joint compound is allowed to dry thoroughly between coats (see Drying Time Guide, Chapter 2). *Exception:* DURABOND Joint Compound-Taping need only have hardened prior to the fill coat application.

7. Inspect second and third coats over joints for smoothness and for proper edge feathering. Only compatible compounds should be used over DURABOND compound.

8. Examine fastener heads and metal trim to see they are completely covered.

9. See that all finished joints are smooth and dry before decoration. Sand smooth if necessary.

Temperature

In cold weather, see that temperatures between 55° and 70°F are maintained both day and night. This temperature should be maintained 24 hours before, during and after the entire wallboard and joint treatment application (see Chapter 2).

Ventilation

Check for proper ventilation to provide drying of joint compound in about 24 hours. Avoid drafts during hot dry weather that cause too rapid drying of compound (see Chapter 2).

Special Applications

Review installation recommendations for special applications such as back-blocking, floating angle, predecorated panels, SHEETROCK W/R Gypsum Panels, arches, sliding door lamination and see that procedure is correct.

chapter 6

tools

page
PANEL APPLICATION TOOLS 285
Handling 285
Measuring 285
Cutting 286
Hammers 286
Screw Guns 287
METAL FABRICATION TOOLS 288
Stud and Runner Shear 288
Metal Lock Fastener 289

page
JOINT TREATMENT TOOLS 289
Mixing Equipment 289
Applicators 291
Finishing Tools 293
Sling Psychrometer 294
PANEL LAMINATION TOOLS 294
Joint Compound and Adhesive Spreaders 294
MISCELLANEOUS EQUIPMENT 295
Handling Equipment 295
Wedge Block 296
Spray Texturing 297

the tools you need

Suitably designed tools are of major importance in assuring a high quality of workmanship. The right tools for a particular job can result in improved efficiency and man-hour savings. In this section you will find tools specifically designed to meet the needs of the drywall contractor, along with information on tool construction, rental, purchase and application.

Through experience it has been found that some tools may be easily and economically fabricated on the job. Construction details, instruction in use, and typical applications are included.

Where applicable, the original manufacturer is listed with the description of each tool. In addition a symbol is used to denote another source or sources of procurement. Here is the key to the symbols used throughout this section.

key to symbols used

* Wallboard Tool & Equipment Co.
1708 Seabright Ave.
Long Beach, Calif. 90813

† Goldblatt Tool Company
1910 Walnut St.
Kansas City, Mo. 64141

▲ Camco Supply Company, Inc.
5833 Outlook
Mission, Kas. 66202

★ Available from *, †, ▲

†† Ames Taping Tools, Inc.
505 O'Neill Ave.
Belmont, Calif. 94002

** Behr Manning Co.
Troy, N.Y. 12180

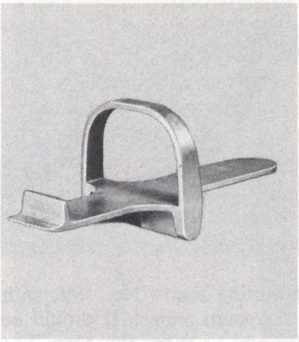
(H) Available at hardware stores

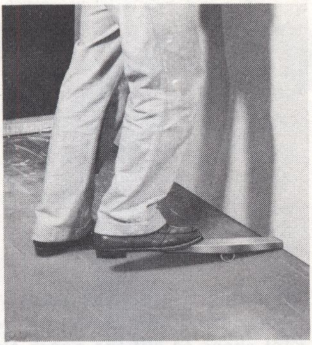
(L) Available at lumber dealers

(P) Available at paint stores

panel application tools

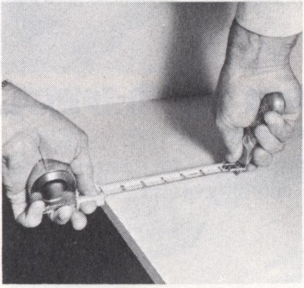
handling

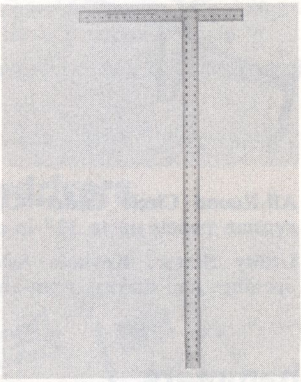




Foot-Power Panel Lifter—This device is designed to move gypsum panels against the wall as it lifts. The tool is primarily used to raise the lower course of horizontally applied SHEETROCK Panels into nailing position. Vertically applied SHEETROCK may be raised in the same manner. Available from B. E. Gillespie, Box 446, Refugio, Texas 78377. A similar tool is available from Ames Taping Tools, Inc. ††

measuring

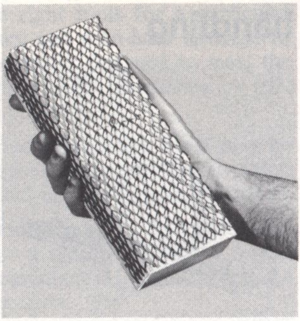




Steel Rule—King-size white face steel rule with Tru-Guide measuring aid and Tru-Cut tape-tip.★

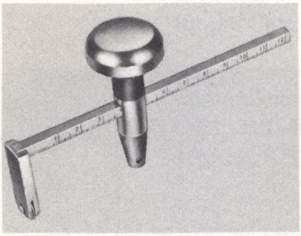
Straightedge—A calibrated metal straightedge and T-square used as a guide in making cuts across the full four-foot width of the panel. It eliminates the need for drawing lines, thus speeds accurate cutting. A metal edge is preferred because it prevents the knife from cutting into the edge as board is scored.★ Also available in special design for eased-edge SHEETROCK SW Panels.†

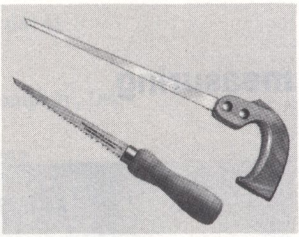
cutting



Trimming Knife—The Stanley Trimming Knife No. 199, with changeable blades, is used to score gypsum panels. It should be kept sharp to cut the paper cleanly and to score the core. The handle is taken apart to change blades. Spare blades are inside. Manufacturer: Stanley Tool Co., New Britain, Conn. 06050.† (H)

Rasp—This tool is made on the job and is used to trim or smooth cut ends or edges of SHEETROCK. It consists of a 2″x4″ wood block with metal lath stapled to the face.



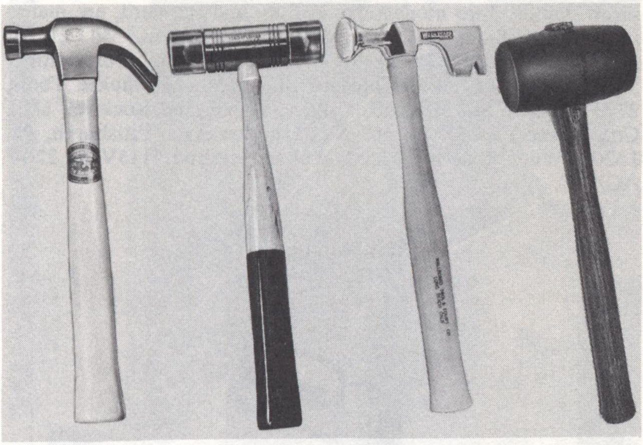


All-Round Circle Cutter—Cuts clean, sharp, round holes in gypsum panels up to 12″ in diameter.★

Utility Saw★, Keyhole Saw (H)—Used for cutting small openings and making right-angle cuts in gypsum panels.

hammers

The proper hammer for nailing SHEETROCK panels has round edges and a slightly crowned head which forms a "dimple" in the face of the board as the nail is "driven home." A hammer with a flat head and sharp edges will fracture the paper around the nail head and these cracks around the hammer head imprint may eventually appear through the decoration. The head of a lather's hatchet is too flat and its corners too sharp. A ball-peen hammer is too heavily crowned. A regular hammer head may be easily crowned with a file, if necessary. For driving nails in U.S.G. predecorated panels, a plastic-headed hammer, a rawhide mallet, or a regular hammer covered with pliable leather should be used to avoid chipping the enameled nail head.



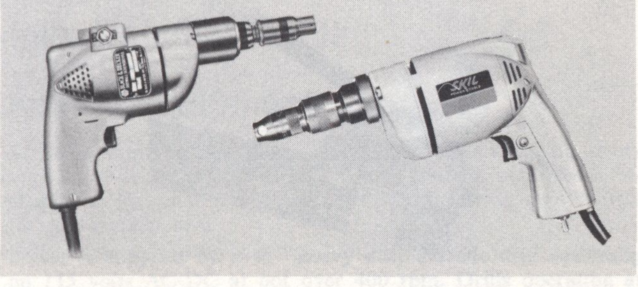
16-oz. Crown Head—Carpenters' claw hammer with crown head will dimple gypsum panels properly. (H)

Plastic-Headed Hammer—For driving special nails used with predecorated panels and applying trim in SHEETROCK Demountable Partition. (H)

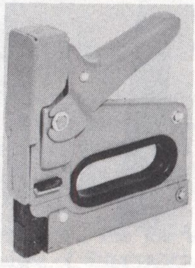
Wal-Board Hammer—Has a symmetrical convex face designed to compress gypsum panels and leave a perfect "dimple."★

Rubber Mallet—For impacting gypsum panels in adhesive nail-on method of application. (H)

power-driven screwdrivers



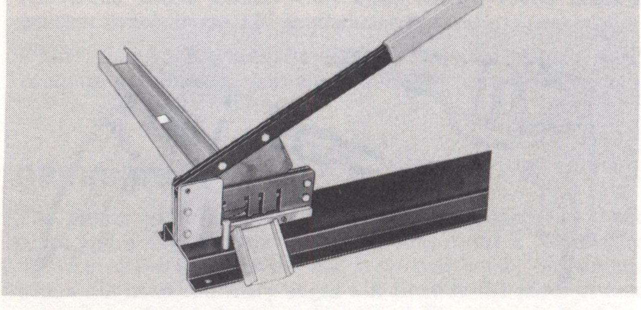
The electric, power-driven screwdrivers shown here are the type used to drive USG Brand Screws Types W, S, S-12, and G for attachment of gypsum panels to wood or metal framing or to gypsum core materials in laminated construction. These tools are designed to drive Phillips head steel screws to a preset depth below the panel surface, where the bit tip will be disengaged by a clutch mechanism. The magnetic bit tip holds the screw in position, ready to be driven. The tool may be set for various screw depths. Two models, heavy-duty and standard, are manufactured by Black & Decker Mfg. Co., Towson, Md. 21204; Millers Falls Co., Greenfield, Mass. 01301; Skil Corporation, 5033 No. Elston Ave., Chicago, Ill. 60630; Milwaukee Tools, 2773 So. 29th St., Milwaukee, Wisc. 53246; and Rockwell Mfg. Co., Power Tool Divn., 662 N. Lexington Ave., Pittsburgh, Pa. 15208. When ordering specify voltage desired: 115V or 220V AC/DC.



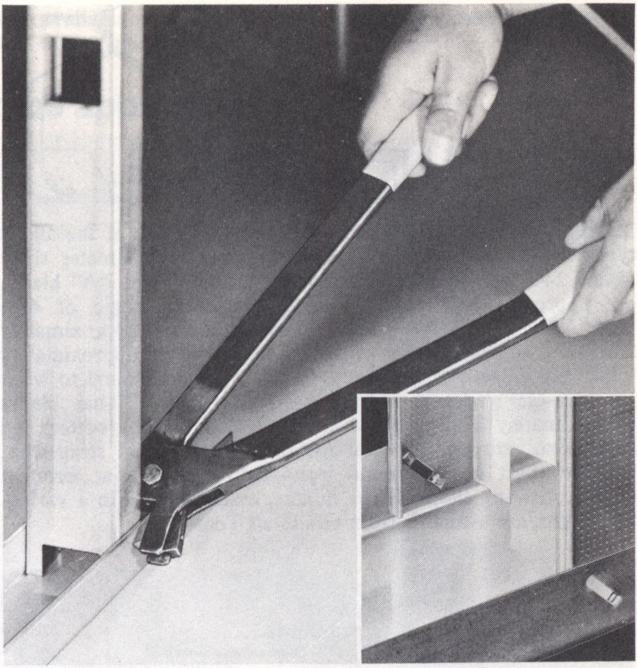
Pistol-Type Stapler—Used to attach base-layer panels and THERMAFIBER Blankets to wood studs. (H) (L)

metal fabrication tools

shear and fastener



Stud and Runner Shear—A versatile tool for the drywall installer. The SR-6 Channel Shear is designed to cut 1⅝″ to 3⅝″ studs and runners.†



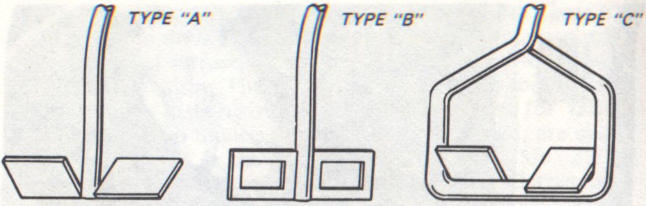
USG Metal Lock Fastener—Specially designed to rigidly attach metal studs to drywall runners and metal trim to drywall studs. This tool quickly pierces and folds over light-gauge metal to form a positive, permanent lock. It insures a smooth stud face without fastener protrusions for flush gypsum panel attachment. Available from United States Gypsum.

joint treatment tools

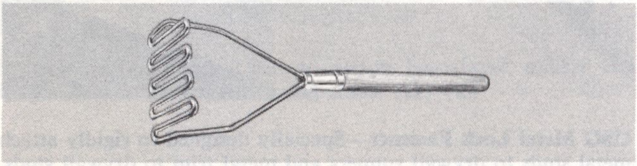
mixing equipment

While hand mixing of U.S.G. joint compounds is adequate, many applicators prefer electric mixers. Power mixing saves considerable time, particularly on large jobs where mixing in a central location is convenient.

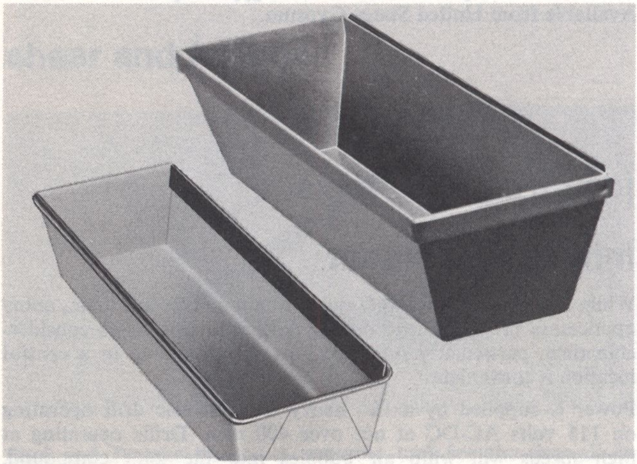
Power is supplied by a ½″ heavy duty electric drill operating on 115 volts AC-DC at not over 400 rpm. Drills operating at high speeds will whip air bubbles into the joint compound, rendering it unfit for finish coat purposes. If available at reasonable costs, drills of 200 to 300 rpm are even better.



Mixing Paddles—Mixing paddles may be any one of the above types or variations thereof consisting of a ⅜″ diameter shaft about 24″ long to which blades are welded. Type "A" blades are approximately 1¼″x3″ welded on at an angle of 45°. Type "B" has three equally spaced blades approximately 2″x3½″ welded in line with the shaft. Slots approximately 1″x2″ are cut out of the blades to allow the compound to work through the blades in a folding action. Type "C" has blades approximately 2″x2″ welded at a 45° angle on the bottom leg of a 4″x6″ stirrup. Material for the blades is ⅛″ strap iron, for the shaft is ⅜″ round iron—both available at wrought iron fabricating shops. Other mixers, manufactured in a variety of designs, are available from Goldblatt Tool Co.†



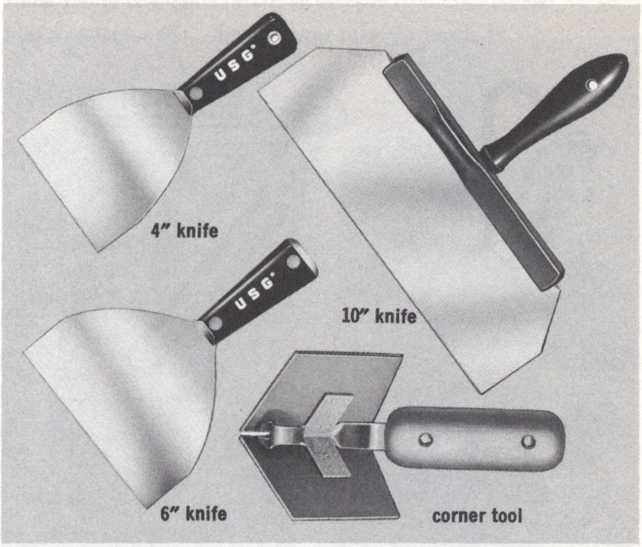
Potato Masher—Used to hand-mix joint compound. Available at restaurant supply companies or drywall accessory suppliers.††★



Mud Pan—Made of long-wearing plastic, nonbreakable and unaffected by temperature changes or chemicals. Size 12″x4⅝″.

Also available in steel with tapered ends, rolled edges and spring steel wiping blades—size 15″x4⅝″.†

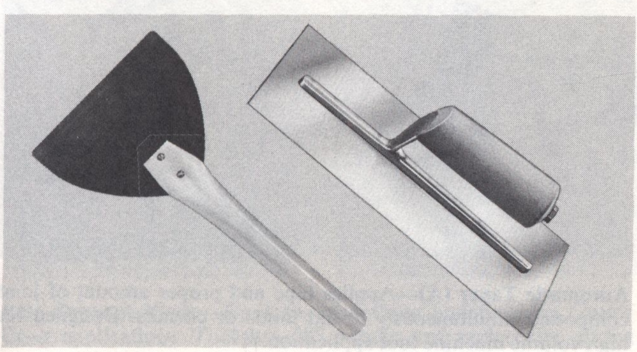
tape applicators



4″, 5″, & 6″ USG Joint Finishing Knives—Professionally designed with square corners for flat work or to effectively work both sides of corner at one time. Available with either plain handle (as in 4″ knife shown) or hammer head handle (as with 6″ Knife). Also available in regular shaped, standard blade knives (not shown). From United States Gypsum.

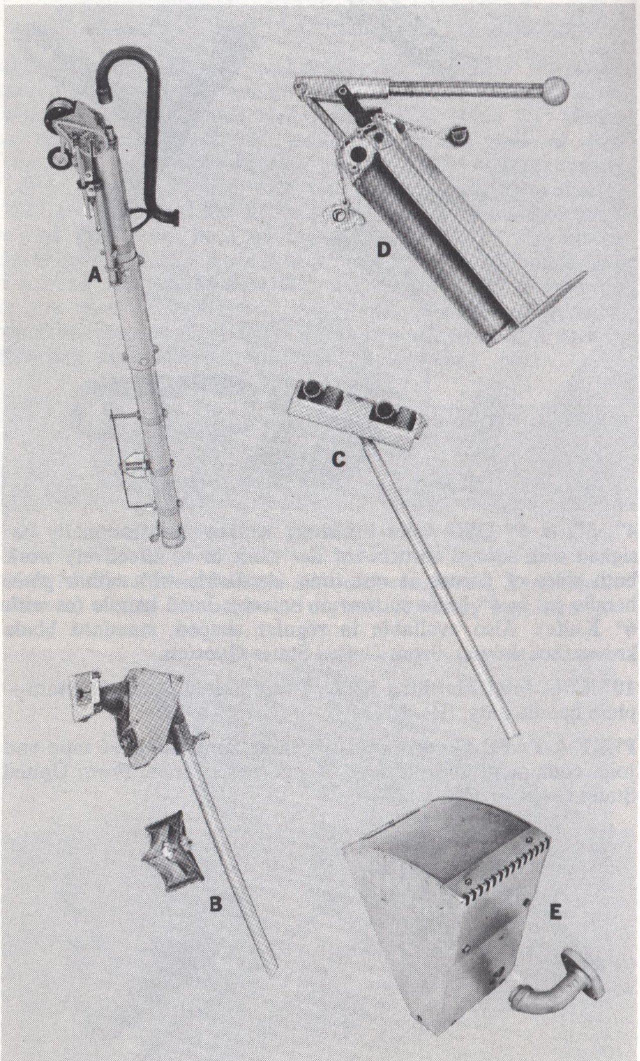
10″ USG Joint Finishing Knife, from United States Gypsum—plain handle only. (H) (L) (P)

PERF-A-TAPE Corner Tool—Permits application of tape and joint compound to both sides of a corner at once. From United States Gypsum. (H) (L) (P)



Broad Knife—Used for wiping excess joint compound from taped joints. Available with regular or long handle; 7″ replaceable blades.† (See page 291.)

11″ Trowel—Used to apply joint compound in large areas or may be notched for use as a spreader tool. (H) (See page 291.)



Automatic Taper (A)—Applies tape and proper amount of joint compound simultaneously to flat joints or corners. Designed for high volume machine tool application.††

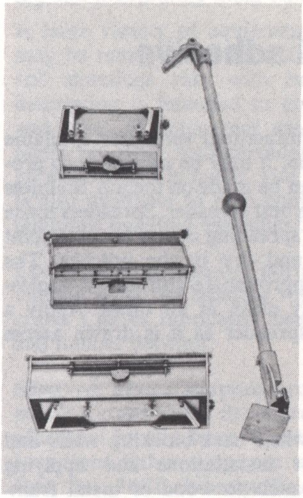
Corner Roller (B)—Used to embed tape in corner and force excess compound from under tape prior to finishing.

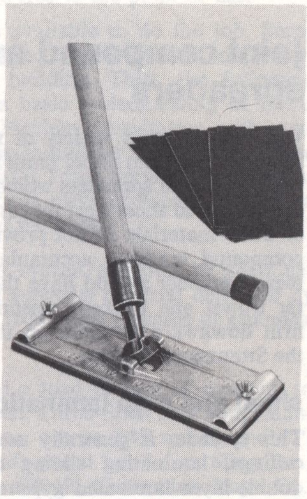
Corner Finisher (C)—distributes excess compound evenly over tape and feathers edges.

Hand Pump (D)—fills mechanical tools from 5-gal. pail.

Flat Applicator (E)—finishes over fastener heads.††

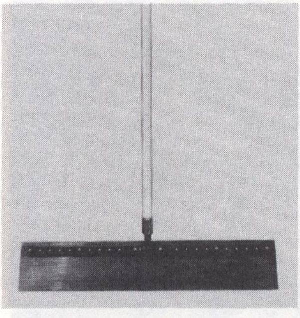
finishing tools

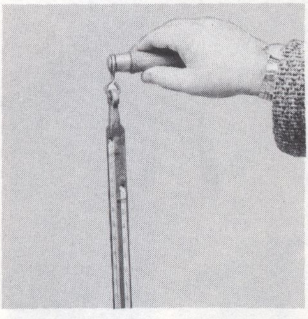




7″, 10″, 12″ Ames Finishing Tools—Used for application of successive coats of U.S.G. Joint Compounds. Also used for mechanical tool application of Cover Coat Compound.††

Pole Sander—Used for sanding ceilings and walls from the floor. Tool has a 48″ handle, aluminum sanding block, and a universal joint.††





Pole Drywall Blade—Used for smoothing and finishing Cover Coat applications. Tool has 48″ handle and replaceable spring steel blade 24″ or 26″ wide. Also known as Ames Acoustical Knife.†† (Bottom left, page 293.)

Sling Psychrometer—Used to determine temperature and humidity for figuring joint compound drying time. Available from chemical supply firms. (Bottom right, page 293.)

“Durite Screen-Bak” Sanding cloth—320 grit (fine) and 220 grit (medium). Used for sanding successive layers of joint compound.** (Not illustrated.)

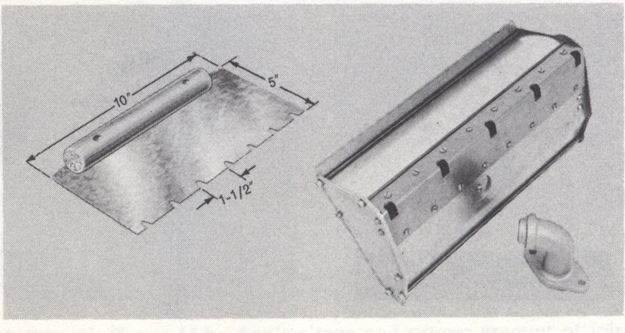
joint compound and adhesive spreaders

While there are a variety of manufactured spreaders available for use in gypsum panel lamination, it may be necessary to provide additional spreaders which can be made on the job. Stainless or galvanized sheet steel makes the best spreader. Spreaders made of other materials do not provide spreading action because joint compound tends to accumulate and dry in the notches. The metal spreader should have the approximate stiffness of a plaster trowel and be kept reasonably clean at all times. Apply a firm downward pressure on the spreader as it is drawn across the SHEETROCK surface.

sheet and strip lamination

This spreader is generally used when back-blocking walls and ceilings, laminating sliding door installations and applying double-layer laminated gypsum panels to wood or metal framing. Notches are spaced 1½″ to 2″ o.c. Each notch is ½″ deep, ⅜″ wide at the base with an inverted “V” shape. A piece of wood dowel, window stop, etc., provides a grip when attached near the edge of the blade.

For notch size and spacing of adhesive beads used in various partition systems, refer to descriptions in Chapter 2.



Mastic Spreader—Used to apply adhesive in vertical strips to base-layer panels in strip-laminated partition construction.††

miscellaneous equipment

materials handling equipment

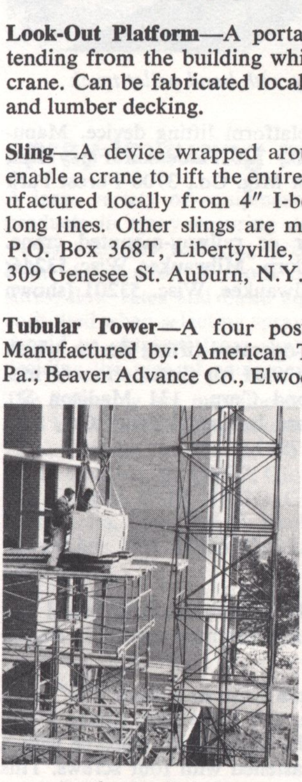
The development of better systems with improved sound and fire resistance has opened a whole new opportunity for drywall in high-rise construction. Important to these applications is efficient, low-cost handling of gypsum panels at the job site. This includes elevating the materials to the required heights, unloading and distributing them damage-free to the point of use.

A large variety of equipment is available to do the job. Some may be rentable and some furnished by the general contractor. Job situations vary with each building. Thus, the following description is intended to give a basic understanding of terms and types of equipment used. Further consultation with suppliers for their recommendations should be undertaken before an expenditure is made. The U.S.G. Trade Services Department is also available to help contractors solve problems relating to materials handling equipment and methods.

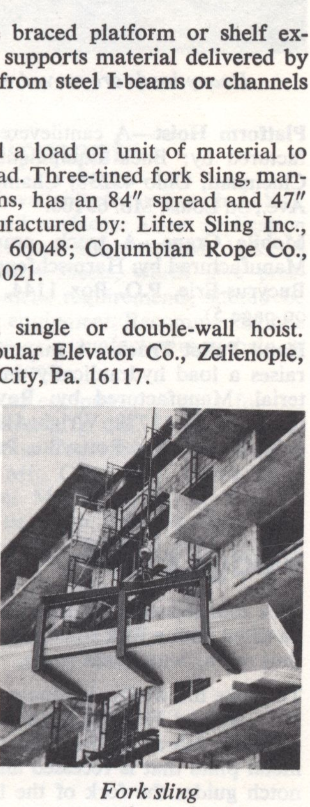
Look-Out Platform—A portable braced platform or shelf extending from the building which supports material delivered by crane. Can be fabricated locally from steel I-beams or channels and lumber decking.

Sling—A device wrapped around a load or unit of material to enable a crane to lift the entire load. Three-tined fork sling, manufactured locally from 4″ I-beams, has an 84″ spread and 47″ long lines. Other slings are manufactured by: Liftex Sling Inc., P.O. Box 368T, Libertyville, Ill. 60048; Columbian Rope Co., 309 Genesee St. Auburn, N.Y. 13021.

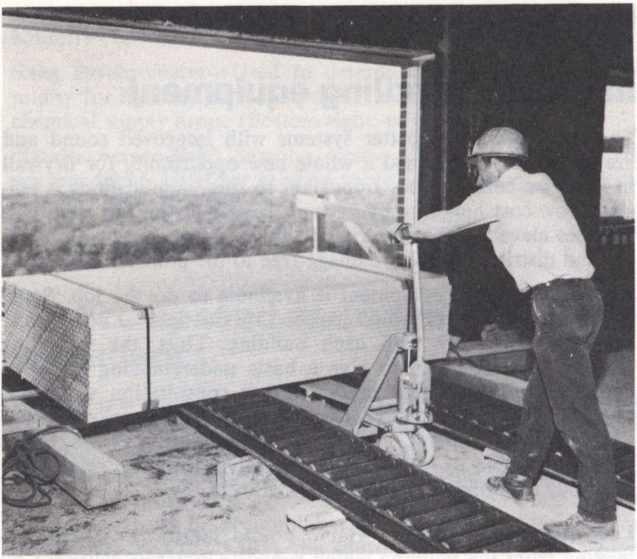
Tubular Tower—A four poster, single or double-wall hoist. Manufactured by: American Tubular Elevator Co., Zelienople, Pa.; Beaver Advance Co., Elwood City, Pa. 16117.



Look-out platform, sling and tower



Fork sling moves heavy loads



Heavy loads are moved easily with hand pallet truck

Platform Hoist—A cantilevered platform lifting device. Manufactured by: Buck Equipment Co., 720 Anderson Ferry Rd., Cincinnati, Ohio 45238; Champion Mfg. Co., 3700 Forest Park Ave., St. Louis, Mo. 63108.

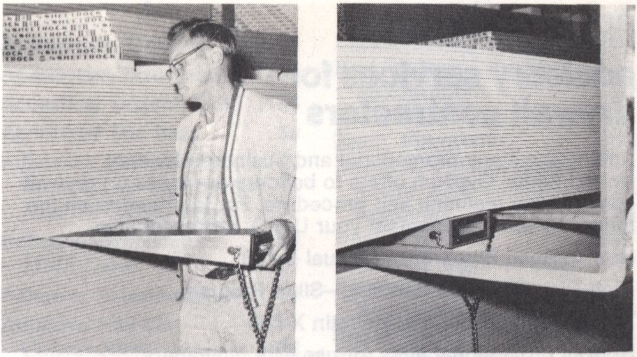
Mobile Crane—A truck, crawler or railway-mounted crane. Manufactured by: Harnischfeger Corp., Milwaukee, Wisc. 53246; Bucyrus-Erie, P.O. Box 1144, Milwaukee, Wisc. 53201 (shown on page 5).

Hand Pallet Truck—A manually operated lifting device which raises a load hydraulically and is used for distribution of material. Manufactured by: Raymond Corp., 131 Madison St., Green, N.Y. 13778; Wright-Hibbard Industrial Truck Co., 19th & West End Ave., Pottsville, Pa. 17901.

wedge block

This tool separates gypsum panels so that stacks of board can be lifted with a fork truck. Eliminates need for spacers in stacks, thus saving warehouse space.

To make the wedge, laminate maple strips in a block 9½″ wide, 30″ long and 3½″ thick, and taper to a knife edge. Rout a 1″x5″ curved notch at the butt end of the wedge and reinforce with a metal plate that is recessed and fastened with four screws. This notch guides the fork of the lift truck when forcing the wedge between panels.



For removing the wedge when stacking panels, attach a one-piece, ⅜″ Y-chain, 11 ft. long, at the thick end of the wedge. Use ⅜″x4″ lag bolts spaced 2″ from the end and centered along the edges. Soak wedge in linseed oil, then sand, wax and polish.

Wedge blocks may be purchased through Building Supply News, 5 S. Wabash Ave., Chicago, Ill. 60603.

spray texturing equipment

A large variety of equipment is available for use with U.S.G. products in spray-texturing drywall surfaces. Since application varies with the texturing product and finish desired, U.S.G.'s Paint Application Methods direction sheets, which give pressures, flow rates and basic equipment requirements, should be consulted when selecting spraying equipment. Recommendations should be obtained from suppliers or manufacturers to help in deciding the type of equipment needed.

The following are manufacturers of equipment suitable for use with U.S.G. texturing products: Binks Mfg. Co., 3114-44 Carroll Ave., Chicago, Ill. 60612; De Vilbiss Co., 1280 W. Washington Blvd., Chicago, Ill. 60607; Glover Mfg. Co., 850 E. Valley Blvd., San Gabriel, Calif. 91776; Grover Mfg. Co., 620 S. Vail St., Montebello, Calif. 90640; Hackel Bros. Inc., 8519 W. Kaul Ave., Milwaukee, Wis. 53225; Quickspray, Inc., Box 327, Port Clinton, Ohio 43452.

appendix a

advisory services for drywall contractors

Among the many promotional and business aids that United States Gypsum offers to builders are these on drywall construction planning and procedure. For information on the following services, contact your U.S.G. representative.

How to Read Blueprints—Manual E-153

High-Rise Materials Handling—Slide Program

Truck-Mounted Booms—Bulletin X-650

Drywall promotional films for use with customers

appendix b

agency addresses

ASHRAE— American Society of Heating, Refrigerating & Air Conditioning Engineers, Inc.
345 E. 47th St., New York, N.Y. 10017

ASTM— American Society for Testing & Materials
1916 Race St., Philadelphia, Penna. 19103

BOCA— Building Officials Conference of America
1313 E. 60th St., Chicago, Ill. 60637

FHA— Federal Housing Administration
1626 K St. NW., Washington, D.C. 20410

GSA— General Services Administration
18th & F Sts. NW, Washington, D.C. 20405

NFPA— National Fire Protection Association
60 Batterymarch St., Boston, Mass. 02109

UL— Underwriters' Laboratories
207 E. Ohio St., Chicago, Ill. 60611

GA— Gypsum Association
201 N. Wells St., Chicago, Ill. 60606

ANSI— American National Standards Institute
1430 Broadway, New York, N.Y. 10018

ICBO— International Conference of Building Officials
50 S. Robles, Pasadena, Cal. 91101

A Ins A— American Insurance Association
85 John St., New York, N.Y. 10038

SBCC— Southern Building Code Congress
1116 Brown-Marx Bldg., Birmingham, Ala. 35203

A

- Accessories, Drywall Trim **24**
- Accessories, Structural **30**
- Acoustical Sealant, USG **35**
- Acoustical Tile Base **20**
- Adhesives, DURABOND **42**
  - *Multi-Layer Application* **75**
  - *Nail-On Application* **72**
- Adhesive Applicator **294**
  - *Multi-Layer* **77**
- Adhesive Attachment **63**
- Adhesive Nail-On Construction **72**
  - *Equipment* **74**
  - *Fastener Spacing* **75**
- Adhesives and Fasteners **36**
- Adjustable Wall Furring Bracket **33**
- Advantages of Drywall Construction **8**
- All-Round Circle Cutter **286**
- All Purpose Joint Compounds
  - PERF-A-TAPE **47**
  - USG Ready-Mixed **48**
- Aluminum H-Moldings **26**
- Ames
  - *Taping Tools* **292**
  - *Finishing Tools* **293**
- Angle Runner, Metal **31**
- Applications, Types of **62**
  - *Single Layer* **62, 79, 90, 97**
  - *Double Layer* **62, 85, 96**
  - *Predecorated Panels* **99**
  - *Resilient* **87**
  - *SHEETROCK W/R* **106**
  - *Exterior Soffits* **114**
- Application Recommendations **68**
  - *Back-Blocking* **82**
  - *Gypsum Panel* **68**
  - *Metal Trim* **117**
  - *Control Joint* **119**
  - *Joint Systems* **124**
- Applicators, Joint Compounds **291**
  - *Tape* **291**
- Arches **160**
- Attenuation Blankets, THERMAFIBER Sound **34**
- Automatic Taping Tool **292**

B

- Back-Blocking System **82, 95**
- Backing Board Products, Specifications **20**
- BAXBORD Backing Boards **20**
- Beam Fireproofing **198**
- Blankets, THERMAFIBER
  - *Sound Attenuation* **34**
  - *Insulating Wool* **34**
- Blisters in Tape **267**
- Borrowed Light Frames **149**
- Brackets, Adjustable Wall Furring **33**
- Broad Knife **292**
- Burred Panel Ends **262**

C

- Caged Beam Construction **198**
- Carport Ceilings **114**
- Caulking Application **141**
  - *Installation* **142**
- Ceiling Board, Exterior Gypsum **16**
  - *Application* **114**
- Ceiling Systems
  - *Single Layer* **191**
  - *Double Layer* **192**
  - *Resilient Channel* **194**
  - *Radiant Heat* **197**
  - *Application* **109**
  - *Metal Furring Channel* **195**
  - *Fire and Sound Resistance* **236**
- Ceramic Tile Base **16**
- Channel, Metal Furring **32**
- Channel, Resilient, RC-1 **33**
- Channel
  - *USG Cold Rolled* **32**
  - *USG Z-Furring* **32**
- Chase Wall-Metal Stud Partition System **92**
- Circle Cutter, All-Round **286**
- Clip, Metal Furring Channel **32**
- Cold-Rolled Channel, USG **32**
- Column Fire Protection **210**
  - *Fire Resistance* **211, 245**
- Conditions, Temperature and Humidity **67**
- Construction Practices **64**
- Control Joints No. 093, No. 75 **27**
  - *Specifications* **28**
  - *Application* **119**

- Coreboard, USG 1″ **20**
- Corner
  - *Reinforcement* **24**
  - *Floating Interior Angle* . **81**
- Corner Roller, Corner Finisher, Tools **292**
- Corner Tool, Perf-A-Tape **291**
- Corrections, Framing....... **65**
- Cover Coat Drywall Compound **48**
  - *Application* **131**
- Cracking, High-Rise **275**
- Cracks in Inside Corners .. **267**
- Crane, Mobile **296**
- Crowned Joints **268**
- Curved Surfaces **160**
- Cutting Gypsum Panels
  - *Methods* **69**
  - *Tools for* **286**

D

- Damaged Panel Edges **263**
- Decorating
  - *General Recommendations* **49**
  - *Products* **49**
- Demountable Partition Systems **189**
- Design Recommendations . **62, 225**
- Door Frames, Metal **149**
- Door Lamination, Sliding **162**
- Dorvon FR-100 .... **35**
- Double-Layer Application **62, 85, 96**
- Double-Layer Ceiling System **192**
- Double-Layer-Metal Stud Partition Systems **178**
- Double-Layer-Wood Stud Partition Systems **172**
- Double Nailing Application **72**
- Drywall Adhesives
  - *Selector Chart* **43**
  - *Specifications* **43**
- Drywall Soffits **114, 163**
- Drywall Systems, Gypsum **170**
- Dur-A-Bead Corner Reinforcement **25**
  - *Application* **117**
- Durabond Adhesives **42**
  - *Selector Chart* **43**
- Durabond Joint Compounds **47**
  - *Application* **125**
- Durabond Vinyl Foam Tape **42**

E

- Econo Corner Reinforcement **25**
  - *Application* **117**
- Edge Crack in Tape **267**
- Electrical Fixture Installation **153**
- Environmental Conditions **67**
- Estimating Materials **65**
  - *Joint System Products* ... **66**
- Exterior Ceilings and Soffits **114**
- Exterior Gypsum Ceiling Board **116**
  - *Application* **114**
- Exterior Wall Furring
  - *Metal Furring Channel* . **202**
  - *INSO-BAK Rigid Furring* **206**
  - *Free-Standing Furring* .. **206**
  - *Z-Furring Channel* **207**

F

- Fabrication Tools, Metal .. **288**
- Fastener Spacing **93, 96**
- Fasteners **36**
  - *Load Tables, Partitions* . **259**
  - *Recommendations* **68**
  - *USG Brand Screws* **36**
  - *Nails* **40**
  - *USG Drywall Adhesives* . **42**
  - *USG Metal Lock Tool* . **289**
- Fastening Methods **69**
- FHA Standards **221**
- Field Problems **262**
- Finish Problems **264**
- Finish Products, Joint Treatment **46**
- Finishing Tools **293**
- Fire and Sound Test Data . **277**
- Fire Fighter Gypsum Board **23**
  - *Installation* **113**
- Fire Protection, Column .. **210**
- Fire-Resistance Ratings, Selector Guide **226**
- Fire-Resistance Testing ... **220**

FIRECODE Core
  SHEETROCK Panels...**14**
  Specifications...**17**
  BAXBORD Backing Board...**20**
Fireproofing, Beam...**198, 251**
Fitted Panels, Improperly...**262**
Fixture Attachments, USG Drywall Partitions...**154**
Fixture Installation...**153**
Flat Applicator...**293**
Flat Plate Cracking...**275**
Floating Interior Angle...**81**
Foil-Back BAXBORD...**20**
Foil-Back SHEETROCK...**15**
Fractured Panels...**264**
Frame Installation, Door and Borrowed Light...**149**
Framing
  Requirements...**64**
  Corrections...**65**
Framing Erection, Furred Ceiling...**93**
Framing Spacing...**94, 258**
Framing Problems...**266**
Furring, Metal...**202**
Furring, Wood...**81**
Furring Bracket, Adjustable Wall...**33**
Furring Channel Clip, Metal...**32**
Furring Channel, Metal...**32**
  Clip...**32**
Furring Systems...**202**

G

Galvanized Tie & Hanger Wire...**33**
Good Construction Practices...**64**
Gypsum Drywall Systems, USG...**170**
Gypsum Panel Products...**12**
  Application...**68**
Gypsum Sheathing...**22**
  Application...**112**

H

H-Molding...**26**
Hammers...**286**
Hand Pallet Truck...**296**
Hand (Joint Compound) Pump...**293**
Hand Shear...**153**
Handling and Storage...**67**
Handling Equipment...**295**
Handling Tools, Drywall...**285**
Hanger Wire...**33**
High Joints or Crowns...**268**
High-Rise Cracking...**275**
Hoist, Platform...**296**
Horizontal vs. Vertical Panel Application...**63**
Humidity, Conditions...**67**

I

Improperly Fitted Panels...**262**
INSO-BAK Rigid Insulation...**35**
  Application...**206**
Inspection, Job...**277**
Installation, Methods of...**62**
Installation Recommendations...**62**
  Adhesive Nail-On...**72**
Insulating
  SHEETROCK Panels...**15**
  BAXBORD Backing Board...**20**
Insulating Wool Blankets, THERMAFIBER...**34**
  Attachment...**139**
Insulation...**34**
Interior Angle, Floating...**81**
Interior Metal Studs...**30**
Interior Soffits...**163**
Interior Texture Finishes...**49**
Isolation, Perimeter...**145**

J

Job Inspection...**277**
Job Planning...**63**
Job Storage...**67**
Joint and Corner Reinforcement and Concealment...**117**
Joint Compound,
  DURABOND...**47, 122**
  USG...**46, 123**
  PERF-A-TAPE...**46, 123**
  Applicators...**291**
  Mixing Equipment...**289**
  Spreaders...**294**
  Water Quantity...**122**
Joint Compound-Taping,
  DURABOND...**47**
  PERF-A-TAPE...**47**
  USG...**46**
  Mixing...**121**

Joint Darkening or
  Lightening 264
Joint Finishing Knife,
  USG Steel 291
Joint Problems 262
Joint Shrinkage 269
Joint System Application . 120
  Conditions 120
  Mixing Procedures 121
Joint System,
  Weather Tips 132
Joint Treatment
  Recommendations 120
  Estimating 66
  Application 120
  Drying Time 138
  Tools 289
Joint Treatment Products . . 44
  DURABOND 47
  PERF-A-TAPE 46
  READY-MIXED 47, 48
  USG 46
  Specifications 49
  Application 120
Joints, Control 27
  Specifications 28
  Application 119

K

Knife, Trimming 221

L

Laboratories, Testing 221
Laminated Gypsum
  Partition Systems
  Vent Shaft 184
  Shaft Walls 188
  Gypsum Panels to
    Masonry 97
Laminating Adhesive,
  PERF-A-TAPE 47
  Application 77
  DURABOND 42
Lamination
  Sheet 77
  Strip 78
  Tools 294
Lifter, Gypsum Panel 285
Limiting Heights
  Metal Stud Assemblies .256
  "Series 4" Partitions . . .257
  Chase Wall Partitions . .257
Load Tables, Drywall 258
Look-Out Platform 295
Loosely Nailed Panels 263

M

Masonry Partitions with
  SHEETROCK Panels 97
Mastic Spreader 294
MASTICAL Underlayment
  Compound 145
Material Estimating 65
Materials-Handling
  Equipment 295
Measuring and Cutting 68
  Application 69
  Tools 285
Mechanical Handling 67
  Tools 295
Metal Accessories for
  Drywall 24
Metal Door Frames 149
Metal Fabrication Tools . .288
Metal Furring Channel 32
  Ceiling System 195
  Wall Furring System . .202
Metal Lock Fastener 289
Metal Runner Attachment . 90
Metal Stud Partition
  Single Layer 177
  Double Layer 178
  "Series 4" 180
  Sound Deadening Board 181
  Chase Wall 183
  Shaft Wall 188
  Fire and Sound
    Resistance 232
Metal Studs 30
Metal Trim, USG Nos.
  200-A, 200-B, 200-C 25
  Application 111
Metal Trim, No. 400 USG . 26
  Application 118
Metal Trim, No. 701 26
  Application 118
Metal Trim, USG 24
  Specifications 28
  Application 117
Metal Window Installation . 152
Mineral Fiber Insulation . . .35
Mineral Fiber Sound
  Deadening Board 35
  Application 140
Mixing Joint Compounds . 121
Mixing Equipment,
  Joint Compound 289
Mixing Paddles 290
Mobile Crane 296

Moldings, Textone ... 29, 105
  Application ... 106
Movable Partition Systems
  USG Demountable ... 189
  ULTRAWALL ... 190
Mud Pan ... 290
Multi-Layer Adhesive Application ... 75

N

Nail Application ... 71
Nail Pops ... 269
Nail Spots ... 267
Nailing Problems ... 269
Nails, Gypsum Panel ... 40
  Application ... 71
  Single Nailing ... 62
  Double Nailing ... 62
  Adhesive Nail-On ... 62
  Selector Guide ... 40

O

Old Wall and Ceiling Surfaces, Resurfacing ... 166

P

Paint Discoloration ... 264
Paint Products
  Selector Guide ... 56
  Texture Finishes ... 49
Panels, Predecorated
  TEXTONE Gypsum ... 18
  TEXTONE Smoothwall ... 18
  Application ... 99
  USG Demountable ... 189
  ULTRAWALL ... 190
Panels—Problems ... 262
Partition Systems
  Wood Stud ... 170
  Metal Stud ... 177
  Laminated Gypsum 184, 188
    Movable ... 189
Perf-A-Tape Reinforcement ... 46
Perf-A-Tape Corner Tool ... 291
Perf-A-Tape Joint Compounds
  Products ... 46
  Mixing ... 123
  Application ... 125
Perimeter Isolation and Control Joints ... 145
Planning the Job ... 63
Plastic Foam Insulation ... 35
  Specifications ... 35
Plastic Tile Base ... 16
Platforms
  Hoist ... 296
  Look-Out ... 295
Pole
  Sander ... 293
  Drywall Blade ... 293
Pops, Nail ... 269
Porch and Carport Ceilings ... 114
Potato Masher ... 290
Power-Driven Screw Attachment ... 70
  Tools ... 287
Practices, Good Construction ... 64
Predecorated Panels
  Specifications ... 19
  TEXTONE Gypsum ... 18
  TEXTONE Smoothwall . 18
  Application ... 99
  USG Demountable ... 189
  ULTRAWALL ... 190
Problems, Sheetrock
  Panels ... 262
  Field ... 262
  Finish ... 264
  Cracking ... 275
Product Standards ... 10
Puncturing of Face Paper . 270
Pyrobar Gypsum Tile ... 23
  Specifications ... 24
Pyrobar Partitions with Sheetrock ... 97

R

Racking Study, USG Gypsum Sheathing ... 258
Radiant Heat Ceiling ... 197
  USG R. H. Base ... 22
  R. H. Filler ... 48
  Application ... 109
Rasp ... 286
RC-1 Resilient Channel ... 33
Ready-Mixed Compound
  USG All Purpose ... 48
  USG Topping ... 48
  Application ... 124

- Recommendations, Gypsum Panel Application **68**
  - *Decorating* **49**
  - *Design* **62**
  - *Joint Treatment* **120**
- Reinforcement, PERF-A-TAPE **46**
  - *Back-Blocking* **82, 95**
  - *Metal Trim Application* . **117**
- Remedies for Drywall Problems **262**
- Repairing Nail Pops **269**
- Repairs, Damaged Panels . **264**
- Requirements, Wood Framing **64**
- Resilient Channel Ceiling System **194**
- Resilient Channel, RC-1 .... **32, 87**
- Resilient Channel—Wood Stud Partition System . . **173**
  - *Installation* **88**
- Resurfacing Old Walls and Ceilings **166**
- R. H. Base, USG **22**
- R. H. Filler, SHEETROCK **48**
- Ridging **268**
- Rigid Insulation Wall Furring System **206**
- Rigid Vinyl Casing **26**
- Rough Framing, Metal Stud **151**
- Runner, Metal Angle Drywall ... **32**
- Runner, USG Metal **30**
  - *Attachment* **90**

S

- Saw, Utility and Keyhole . **286**
- Screwdrivers, Power-Driven **287**
- Screw Application **70**
- Screws, USG Brand **36**
  - *Application* **70**
  - *Specifications* **37**
  - *Selector Guide* **38**
- Sealant, SHEETROCK Brand W/R **16**
- Sealant, USG Acoustical . . **35**
  - *Application* **141**
- Selector Guides
  - *DURABOND Adhesives* . **43**
  - *Fire-Rated Partitions* . . **226**
  - *Sound-Rated Partitions* . **226**
  - *USG Brand Screws* **38**
  - *Texturing Materials* **50**
  - *USG Paint Products* **56**
  - *Nails* **40**
  - *Joint Treatment* **124**
- "Series 4" Partitions **180**
- Shaft Wall **188**
- Shear, Stud and Runner . . **288**
- Sheathing, USG Gypsum . . **22**
  - *Application* **112**
- Sheet Lamination **77**
- SHEETROCK Gypsum Panels . **12**
  - *Application, General* . . **68**
  - *Applications, Special* . . **160**
  - *Base for Wall Tile* . . **16, 106**
  - *Double Layer Application* . . . **62, 85, 96**
  - *Double Nailing System* . . **72**
  - *FIRECODE Foil-Back* . . **15**
  - *Porch and Carport Ceilings Application* . . **114**
  - *Problems* **262**
  - *Single Layer Application* . **62, 79, 90, 97**
  - *Soffit Application* **163**
  - *Specifications* **17**
  - *SW* **14**
  - *SW FIRECODE* **14**
  - *Tapered Edge* **14**
  - *TEXTONE Vinyl Panel* . **18**
  - *ULTRAWALL Panels* . . **190**
  - *W/R Water Resilient* . . . **16**
- SHEETROCK Laminated to Masonry Partition **97**
- SHEETROCK Resilient Channel, RC-1 .... **32**
- SHEETROCK W/R Panels . . . **16**
  - *Application* **106**
  - *Decorating* **109**
  - *Sealer* **16**
- Shrinkage in Joints **269**
- Single Layer Application . . **62, 79, 90, 97**
- Single Layer Ceiling System **191**
- Single Layer—Metal Stud Partition System **177**
- Single Layer—Wood Stud Partition System **170**
- Sliding Door Lamination . **162**

Sling 295
Sling Psychrometer Tool . 294
  Use 137
Soffits
  Exterior 114
  Interior 163
Sound Attenuation
  Blankets 34
  Attachment 139
Sound Control,
  FHA Standards 221
Sound Control and
  Insulation Products 34
  Application 139
Sound Deadening Board—
  Metal Stud Partition . . . 181
Sound Deadening Board
  Wood Fiber 34
  Application 140
  Mineral Fiber 35
  Application 140
Sound-Rated Partitions
  Selector Guide 226
Sound-Resistance Testing . 220
Sound Transmission Loss
  Wood Stud Partitions . . 252
  Metal Stud Partitions . . 253
  Wood Joist Ceilings . . . 254
  Bar Joist Ceilings 255
Spacing of Framing . . 94, 258
Specifications
  Backing Boards 21
  Trim Accessories 28
  Gypsum Panels 17, 21
  TEXTONE Moldings 30
  Metal Stud & Runners . . . 31
  Drywall Adhesives 43
  Joint Treatment 49
  Plastic Foam Insulation . 35
  Predecorated Panels 19
  PYROBAR Tile 24
  R. H. Base 21
  SHEETROCK Panels 17
  USG Brand Screws 37
  USG Gypsum Sheathing . 23
Spray Texturing
  Equipment 297
Spreaders, Joint Compound
  and Adhesives 294
Staggered Stud Partition
  System, USG 175
Stapler, Pistol-Type 288
Starved Joints 269
Steel Column Fire
  Resistance 245
Steel Rule 285
Storage, Job 67
Straightedge 285
Strip Lamination 78
Structural Accessories 30
Stud and Runner Shear . . 288
Studs, USG Metal 30
STYROFOAM FR,
  SM Insulation 33
  Systems 206
Suspended Ceilings
  Grillage Erection 94
  Panel Erection 95
  Back-Blocking 95
Systems, USG Drywall
  Wood Stud Partitions . . 170
  Metal Stud Partitions . . 177
  Chase Wall Partitions . . 183
  Vent Shaft Partitions . . 184
  Shaft Wall 188
  Movable Partitions 189
  Ceilings 191
  Exterior Walls and
    Furring 202
  Column Fire Protection . 210

T

Tackboards, TEXTONE 20
Tape Applicators 291
Tape, PERF-A-TAPE
  Reinforcement 46
Tapered-Edge
  SHEETROCK Panels 14
Taping Tools, Ames 292
Taping Compound
  USG 46
  PERF-A-TAPE 47
  DURABOND 47
Temperature and Humidity
  Conditions 67
Testing Laboratories 221
Tests—Fire and Sound . . . 220
TEXTONE Gypsum Panels . . 18
  Specifications 19
  Application 99
  Tackboards 20
TEXTONE Moldings . . . 29, 105
  Application 118
  Specifications 30
Texture Finishes 49
  Selector Guide 50, 52
  Application 158

- Texturing Problems, Causes & Remedies 53
- THERMAFIBER
  - *Insulating Wool* 34
  - *Application* 139
  - *Sound Attenuation Blankets* 34
  - *Application* 139
- Thermal Transmission Values, Gypsum Products 258
- THURANE Insulation 35
- Tie Wire 33
- Tile Base, Acoustical 20
- Tile Base, Wall, Ceramic, Plastic 16
- Tools 285
- Topping Compound
  - *PERF-A-TAPE* 47
  - *USG* 46
  - *USG Ready-Mixed* 48
- Tower, Tubular 295
- Trim, Metal 24
  - *Application* 117
  - *Specifications* 28
- Trim, USG Metal, No. 200-A, 200-B, 200-C 25
  - *Application* 117
- Trim No. 400 USG Metal 26
- Trim, No. 701 USG Metal 26
  - *Application* 118
- Trim, USG Vinyl 26
  - *Application* 118
- Trimming Knife 286
- Trowel 291
- Truck, Hand Pallet 296
- Twisted Studs or Joists 266
- Types of Application 62

U

- ULTRAWALL Partitions 190

V

- Vent Shaft Construction 184
- Vertical vs. Horizontal Application, Panels 63
- Vinyl Foam Tape, DURABOND 42
- Vinyl Panel, TEXTONE 18
  - *Application* 99
- Vinyl Trim 26
  - *Application* 118

W

- Wall Furring Bracket, Adjustable 33
- Wall Furring, Exterior 202
- Wall Tile Base 16
  - *Application* 106
- Wallboard (See SHEETROCK Gypsum Panels)
- Water-Damaged Panels 264
- Water, Quantity for Joint Compounds 122
- Weather Tips, Joint System 132
- Wedge Block 296
- Window Installation 152
- Wires, Hanger and Tie 33
- Wood Fiber Sound Deadening Board, USG 34
  - *Application* 140
- Wood Framing Requirements 64
- Wood Furring Strips 81
- Wood Shrinkage
  - *Characteristics* 271
  - *Effect on Nails* 272
  - *Nail Pops Resulting* 274
- Wood Stud Partition Systems
  - *Single Layer* 170
  - *Double Layer* 172
  - *Resilient Channel* 173
  - *Staggered Stud* 175
  - *Fire and Sound Resistance* 227

Z

- Z-Furring Channel 32
  - *Application* 207

Digitized by

INTERNATIONAL

ASSOCIATION
FOR
PRESERVATION
TECHNOLOGY,
INTERNATIONAL
www.apti.org

BUILDING
TECHNOLOGY
HERITAGE
LIBRARY

https://archive.org/details/buildingtechnologyheritagelibrary

From the collection of:

United States Gypsum Company

USG
TM

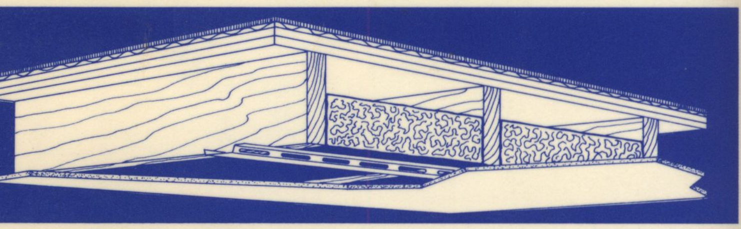
UNITED STATES GYPSUM

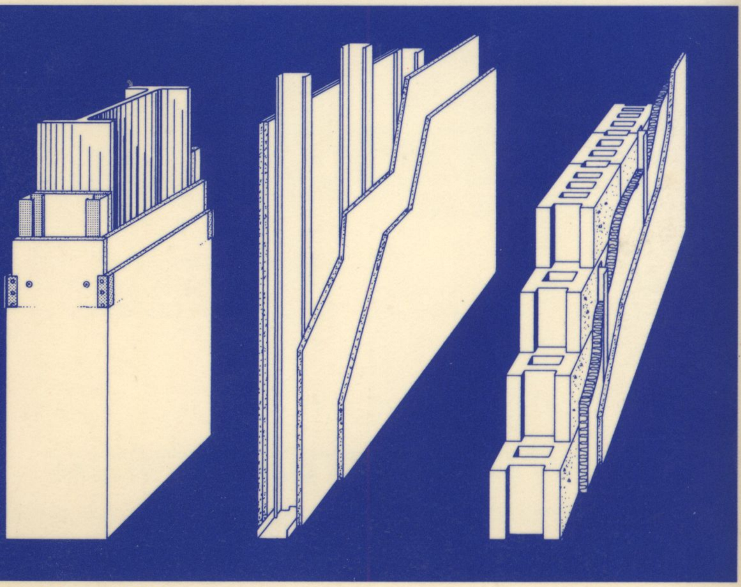
101 S. WACKER DRIVE CHICAGO, ILLINOIS 60606

NITED STATES GYPSUM

S. Wacker Dr., Chicago, Ill. 60606, Dept. 122

rywall
onstruction
andbook





2, USG Rev. 12/71

Printed in U.S.A.